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Abstract and Concrete Behavior. An Experimental Study With Special Tests

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On this occasion I (K. G.) am pleased to acknowledge my indebtedness to the Rockefeller Foundation for continual support of my studies. Both authors would like to express their appreciation to the Montefiore Hospital for the opportunity to use the patients for the studies which were made under the auspices of the Harry H. Straus Fund. Both authors wish in addition to thank Dr. H. F. Harlow of the University of Wisconsin for his careful textual reading and corrections.

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ABSTRACT AND CONCRETE BEHAVIOR

AN EXPERIMENTAL STUDY WITH SPECIAL TESTS

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INTRODUCTION

DIFFERENTIATION AND DEFINITIONS OF THE CONCRETE AND ABSTRACT ATTITUDES

IN recent years the interest of American students in the impairment of integrative mental function as a phenomenon of psychopathology has been growing. This interest is demonstrated by the mounting list of publications reporting the experimental work carried out by different investigators in clinical psychology (68, 20, 21, 25, 9, 10, 41, 27). These studies on behavior changes in the brain-diseased, schizophrenic, ament and dement, focus on the question of impairment of "abstract behavior."

The problem was first discovered and experimentally attacked by Gelb and Goldstein (17), who, during and after the World War, introduced a number of methods for determining the capacity status of patients suffering from brain injuries. These authors and their collaborators devised special sorting tests, e.g., color and object sorting tests for that purpose (18, 70, 35, 5, 61, 36, 63, 22). The analysis of the behavior and the performance changes in such patients led them to make a distinction between two modes of behavior—the abstract and the concrete. The normal person is capable of assuming both, whereas the abnormal individual is confined to but one type of behavior—the concrete. The abstract and concrete behaviors are dependent upon two corresponding attitudes which are psychologically so basic that one may speak of them almost as levels.

The abstract and the concrete attitudes are not acquired mental sets or habits of an individual, or special isolable aptitudes, such as memory, attention, etc. They are rather capacity levels of the total personality. Each one furnishes the basis for all performances pertaining to a specific plane of activity. In other words, each attitude constitutes one definite behavioral range which involves a number of performances and responses. These latter, when taken individually at their surface value, may appear to be discrete entities of quite a diversified nature.¹ Closer analysis reveals that

¹ E.g., attention, recall, retention, recognition, synthesizing, symbolization, etc.

these seemingly diverse performances and responses have as a common basis one functional level of integration, one cross-sectional attitude of the personality: either the concrete or the abstract attitude. Each one is the functional precondition for the concerted operation of different processes; it accounts for their mutual interdependence.

In some ways, the use of the term "attitude" may disturb the psychologist who would prefer the more legitimate terminology of "*mental set*" or "*approach*" as being the more common designations. Both expressions, however, are either too "partitive" and "temporal" in meaning or bear certain behavioristic connotations; and the latter leave little room for an explanatory concept not adhering to the monopolizing claims of "past experience" or "acquired traits." The meaning the authors try to convey by the term *attitude* is rather unique in one respect. Our concept of attitude implies a capacity level of the total personality in a specific plane of activity.

This plane can be related to the outerworld situation or to an inner experience. One can assume either an abstract or a concrete attitude towards the outerworld as well as towards an inner experience. In assuming the one or the other, the individual as a whole gears himself toward a specific direction of activity which we call abstract or concrete behavior.²

For these reasons the departure from common usage may be justified. Yet there are some similarities to the objectives and theoretical approach of certain modern investigators which may be pointed out to the reader. He may relate our conception to the following discussions in contemporary psychology on the question of common functional factors: Karl S. Lashley's excellent paper on functional determinants of cerebral localization (47) and the various investigations of Spearman and Thurstone (67), signifying the search for "common factors" which underlie different partial activities, have some points in common with what we express by the term "attitude." The principal difference between the aforementioned and the approach presented here is that we forego any attempt at statistical methods at this phase of our work and knowledge// We believe it to be the preliminary task, especially of psychopathology, to ascertain data on a descriptive, qualitative level. The distinction between an abstract and concrete attitude in the characterized sense of two different behavioral ranges is of such a preliminary descriptive nature.

The concrete attitude is realistic. It does not imply conscious activity in the sense of reasoning, awareness or a self-account of one's doing. We surrender to experiences of an unreflective character: we are confined to the

² Gordon W. Allport defines attitude and trait as a form of readiness for response (1).

immediate apprehension of the given thing or situation in its particular uniqueness. This apprehension may be by sense or percept, but is never mediated by discursive reasoning. Our thinking and acting are directed by the immediate claims which one particular aspect of the object or of the outerworld situation makes.

The nature of these claims may be experienced in different forms: as sensory impressiveness; as sensory cohesion; as an expressive quality of physiognomies or of things (2, 62); as situational belongingness, be it a manipulative valence (48, 29), a situational familiarity, or a tangible means-end function.

We respond unreflectively to these claims, because they are thrust upon us as palpable configurations or palpable contexts in the experiential phenomenal realm (e.g., the aspect of kindred color or of practical usage, etc.). Most of our common reactions are codetermined by these claims arising from the environing stimuli in our everyday life. Such a claim may constitute a bond between the responding individual and the object, etc. Because of the bondage, the individual cannot easily detach himself from the demand exerted by that experienced uniqueness of the object. Therefore it is difficult, if not impossible, for him to realize other potential functions of this same object, or even to conceive of it as an example, a representative, or a case of a general class or category. This dependence upon immediate claims can take on the characteristic of rigidity and "lack of shifting" well known in abnormal psychology. But it can also take on the characteristic of fluidity which manifests itself in an extreme susceptibility to the varying stimuli in the surroundings. The stimuli are followed as ever newly arising; the person is delivered to their momentary valences. This may appear to be distractibility or continual spontaneous shifting of attention whereas, in reality, the individual is being shunted passively from one stimulus to the next.

The concrete attitude exists also in respect to ideas, thoughts and feelings, even if these experiences are not directly dependent upon the immediate outerworld. With respect to these more subjective experiences, the attitude is also realistic. We surrender to the immediate claims and particular uniqueness of thoughts and feelings in the same way as to the outerworld claims.

The abstract attitude embraces more than merely the "real" stimulus in its scope. It implies conscious activity in the sense of reasoning, awareness and self-account of one's doing. We transcend the immediately given situation, the specific aspect or sense impression: we abstract common from particular properties; we are oriented in our action by a rather conceptual

viewpoint, be it a category, a class, or a general meaning under which the particular object before us falls. We detach ourselves from the given impression, and the individual thing represents to us an accidental example or representation of a category. The abstract attitude is the basis for the following *conscious* and *volitional* modes of behavior:

- 1. To detach our ego from the outerworld or from inner experiences.
- 2. To assume a mental set.
- 3. To account for acts to oneself; to verbalize the account.
- 4. To shift reflectively from one aspect of the situation to another.³
- 5. To hold in mind simultaneously various aspects.
- 6. To grasp the essential of a given whole; to break up a given whole into parts, to isolate and to synthesize them.
- 7. To abstract common properties reflectively; to form hierarchic concepts.
- 8. To plan ahead ideationally; to assume an attitude towards the "mere possible" and to think or perform symbolically.

Concrete behavior has not the above mentioned characteristics.

In order to illustrate the interrelation between the enumerated modes of behavior and the abstract attitude, we will briefly exemplify from case material of cerebral pathology in the following. Within the framework of our discussion, however, any attempt at a presentation of entire case histories and their clinical evaluation would lead too far astray. Therefore, we have to confine ourselves to pointing out certain symptomatic features in the performance of patients which show how the impairment of abstract attitude affects the characterized behavioral modes. With this purpose in mind, it seems rather irrelevant to labor the etiological question in each case, as long as the facts to be cited have been positively ascertained as sequelae to cerebral pathology.

1. To detach our ego from the outerworld or from inner experiences.

Patient F. is asked to take a comb from a table and bring it to the examiner. She cannot do this without combing her hair ("forced responsiveness"). A patient of Head (30) says, "With me it's all in bits, I have to jump like a man who jumps from one thing to the next; I can see them, but I can't express them." Patient Sch. is asked to repeat the sentence: "The snow is black." He states he could not say it, that it was not so. The examiner explained to him that such senseless phrases can be repeated even though they are not true, and then urged the patient to repeat the sentence. Now the patient repeated the requested sentence, but mumbled immediately afterwards: "No, the snow is white." The same patient could not be

³ See to the problem of shift, p. 100.

induced to repeat the sentence "the sun is shining" on a rainy day. Patient Schor, with a paralysis of the right arm was unable to repeat the sentence "I can write well with my right hand." He replaced the word "right" by the word "left." Another patient was well able to use eating utensils while eating, whereas given these objects outside of the eating situation, he produced only a jumble of senseless movements with them. Another patient was unable to drink water out of a glass on command, unless he was really thirsty.

2. *To assume a mental set willfully and consciously.*

A patient is unable to set the hands of a clock to the demanded hour, but can recognize what time it is immediately if presented with the clock. Another patient, whom the examiner started off on a continuous task, e.g., counting or writing letters, is unable to proceed spontaneously if once interrupted; he is unable to initiate an action on his own, to assume a mental set willfully. A patient of Woerkom could give the *series* of the week days and months of the year correctly, but if the examiner named a *particular* day or month, the patient could not give the name of the one preceding or following.

3. *To account for acts to oneself or to others.*

A patient is well able to throw balls into three boxes which are located at different distances from him. He never misses. Asked which box is further and which is nearer, he is unable to give any account or to make a statement concerning his procedure in aiming. Another patient points correctly to the source of a noise, but cannot state the direction from which the noise originated. To do this requires an abstract grasp of spatial relation and the concomitant capacity to account for this understanding by verbalization.

4. *To shift reflectively from one aspect of the situation to another.*

A patient who has just succeeded in reciting the days of the week is now asked to recite the alphabet. He cannot shift to this task, and only after repeated promptings, or better stated, after the examiner has commenced to call out the alphabet, can the patient follow in his recitation. The same phenomenon occurs when the patient has accomplished the task of reciting the alphabet and is then asked to recite the days of the week or the number series. Another patient can call out the number series from one on, but if the examiner asks him to begin with a number other than one, the patient is at a loss, he must start with one. Such patients are often well able to keep up with a conversation initiated by the examiner, but when he sud-

denly shifts the topic to an entirely different context, they are at a loss to understand what he is saying. A patient may be able to read a word, but immediately thereafter cannot spell out the letters of the word and *vice versa*; he cannot shift from one procedure to the other. A patient of Head, after improvement, described his difficulty in performing the head, hand, ear, eye test in his own words thusly: "I look at you and then I say, he's got his hand on my left, therefore it is on the right; I have to translate it, to transfer it in my mind." The mental rigidity of patients of this kind can manifest itself in the following experiment: If confronted with the ambiguous figures of Rubin they will at best recognize one aspect, the face or the vase, but are unable to shift from one aspect to the other.

X 5. *To hold in mind simultaneously various aspects.*

X A patient is instructed to press the lever in the reaction time apparatus set-up at the appearance of the red light. He does this correctly. If, however, instructed to respond to only one of two colored lights which are given in irregular succession (red, green), the patient responds by pressing the lever whenever any one of the lights appears. A patient is instructed to cross out the letter X in one of the concentration tests. She begins by following the instruction but after having carried out the task correctly through a few lines of the test, she continues to cross out every letter. A patient of Gruenberg and Boumann, confronted with the designs of triangles, squares and circles, whose lines partially overlap and cross, is able to point to a place which belongs to one figure at the time, but is completely at a loss to show a point in the design which belongs to both the triangle and the square or the triangle and the circle.

Investigations of such patients with the feature profile test have shown that patients may put in the parts correctly according to shape—as in the open square for the four parts of the ear—but they cannot, at the same time, attend to the lines drawn on these four parts which make up the design of the ear.

X 6. *To grasp the essential of a given whole; to break up a given whole into parts, to isolate and to synthesize them.*

If a patient is confronted with a picture which tells a story (The Terman-Binet Pictures or the Kuhlman, e.g., The Snowball or Blind Man's Buff), he is able only to enumerate individual items and does not grasp the point. He neither finds the essential relations between the persons acting in the picture, nor can he grasp the gist of the story. Evidently, the patient is unable to synthesize the individual events into a meaningful whole. A

patient of Head's (30, p. 113) complains: "I tried working out jigsaw puzzles but I was very bad at them. I could see the bits but I could not see any relation between them. I could not get the general idea."

Certain patients are able to read whole words correctly, but if the letters of the same word are presented separately with a space between each letter, they are then not able to recognize the word.

7. *To abstract common properties reflectively; to form hierarchic concepts.*

A patient can count numbers on his fingers and by various roundabout methods; in this fashion he can even obtain the results which look like subtraction and addition, but he is entirely unable to state whether 7 or 4 is more and has no concept of the value of numbers whatsoever. Patients of this type have no understanding of analogies or metaphors, since in both the abstractions of a common property is necessary. They fail on a simple syllogism or on tests of finding the common denominator of several items. X

8. *To plan ahead ideationally.*

a. Patients can easily find their way in walking from the ward into a room or from the hospital to their home, but if asked to draw a map of their route or to give a verbal account of it, they cannot do it. Many patients of this type are unable to start drawing such a map, but can complete it if the experimenter gives them a starting point, i.e., begins the design for them (Head). Similar to this is the way patients solve the Purse (Ball) and Field Test (Binet), they cannot make a plan of their search.

b. To assume an attitude towards the "mere possible" and to think or perform symbolically.

The patient can use the key to open the door correctly but is unable to demonstrate how to use the key without the door present. Another patient cannot demonstrate how to drink out of an empty glass whereas he can drink out of a full glass. He can knock at a door, but if pulled away from the door by the experimenter so that his arm does not reach the door, he cannot perform this action symbolically. He can write his name on paper, but not in the air. He can blow a piece of paper but cannot demonstrate how to blow without the paper. X

The inabilities here discussed or, for instance, the patient's inability to continue hammering if the nail is removed, indicate that these patients are unable to assume an attitude toward the "mere possible" and are bound to concrete reality.—

We have to differentiate between various degrees of both the concrete and the abstract behavior. First, there are various degrees of abstract

Symbol

behavior corresponding to the degree of ideational complexity which the performance in question involves. For instance, the highest degree of abstract behavior is required for the conscious and volitional act of forming generalized and hierarchic concepts or of thinking in terms of a principle and its subordinate cases and to verbalize these acts. Another instance of similar abstract behavior is the act of consciously and volitionally directing and controlling every phase of a performance—and of accounting for it verbally. A lower degree of abstraction obtains the anticipatory, ideational act of consciously and volitionally planning or initiating insightful behavior without a distinct awareness or self-accounting of every phase of its further course. As a special instance of the latter degree, the understanding of symbols or metaphoric thinking and intelligent behavior in everyday life may be considered. Here it is mostly the *directional* act which is abstract and the ensuing performance runs off on a concrete plane—until difficulties arise. Then the required shift again calls into play the abstract, anticipatory deliberation, and so on.

A gradation applies just as well to concrete behavior. The most concrete way of dealing with situations or things, is to react to one aspect of them exclusively; *i.e.*, reacting to *one* global impression or to one color alone, to a particular form of an object, or to one property of it, as, for example, its practical usage. A less concrete approach is indicated when the person is unreflectively embracing in his scope the total, palpable configuration of an object or situation, and is not determined in his response by any one impressive particularity of it. An unreflective variation of perspective toward the situation is less concrete than a rigid fixation to one aspect of it.

The normal individual combines both attitudes and is able to shift from one to the other at will according to the demands of the situation. Some tasks can be performed only by virtue of the abstract attitude. We are well aware of the fact that we as yet have barely scratched the surface of the problem involved in the interrelation between abstract and concrete attitude in the normal individual. Here only the very first attempts towards an understanding are being made and experimental research has yet to accomplish a highly complex task. At the present state of our knowledge the following points should be emphasized: (1) Although the normal person's behavior is prevailingly concrete, this concreteness can be considered normal only as long as it is embedded in and co-determined by the abstract attitude. For instance, in the normal person both attitudes are always present in a definite figure-ground relation. (2) Which of the two operates in the foreground depends upon the demands of the given situation. (3) In pathology

this relation becomes disorganized, if not disintegrated, into an abnormal condition. Owing to the impairment of the abstract attitude, the concrete plane of behavior has become deprived of the functional control by that "higher" level and acquires an abnormal predominance of an automatic nature which we may call forced responsiveness as to *form* and concreteness as to *content*.

Organic pathology in patients with brain disease disintegrates human behavior in such a way that the capacity for abstract behavior is impaired to a greater or lesser degree in the patient. Thus, he becomes more or less reduced to a level of concreteness of situational thinking and acting so that he can perform only those tasks which can be fulfilled in a concrete manner.

In order to avoid misunderstanding, we have to emphasize that the process of disintegration toward the concrete does not abolish the arousal of ideas and of thoughts as such. What the deterioration affects and modifies is the way of manipulating and operating with ideas and thoughts. Thoughts do, however, arise but can become effective only in a concrete way. Just as the patient cannot deal with outerworld objects in an abstract manner, he has to deal with ideas simply as "things." With respect to the outerworld we may say that concepts or categories, meanings other than situational or means-end relations are not within the patient's scope. This lack of abstract frame of reference holds also for the patient's inner experiences; it manifests itself in his inability to arouse and organize, to direct and hold in check ideas or feelings by conscious volition. He cannot detach his ego from his inner experiences; therefore he is rather a passive subject to instead of an active master of them (e.g., obsession, compulsion, in functional disturbances—rigidity, etc.). In patients with cortical damage, voluntary arousal or recall of images, events, or sentences, etc., is impaired and only takes place if the patient is brought into the concrete situation to which that content belongs.

It should be mentioned that what we have described as conscious volition is a *descriptive* term rather than an explanatory concept. It is to signify the condition in which the organism can come to terms with the environment only by a special activity which is required by the situation. From observation in normal as well as in pathological cases, there can be no doubt that a condition corresponding either to conscious will, or to the loss of it, exists. We need not speculate beyond this descriptive observation as to what kind of psychological "force" this conscious volition might represent. It suffices that this sort of act belongs to the functioning of the *normal* personality on the level of abstract behavior; that its presence or absence coincides with

the presence or absence of the abstract attitude. If this mutual interdependence within the structure of the personality can be taken as a matter of fact, then it is explicable why any defect affecting the abstract behavior must lead to a definite change of the personality as a whole. Since the characteristic changes in patients with brain lesions can be regarded as an impairment of abstract behavior, a variety of symptoms can be ascribed to that *basic* defect which manifests itself in different performance fields.

Thus we are dealing with a basic personality change. From this unitary point of view many of the otherwise separately described disturbances can be made intelligible.

METHODS OF TESTING FOR ABSTRACT BEHAVIOR PREDOMINANTLY QUALITATIVE

The methods of testing to which we now turn, especially the Sorting Tests for determining the impairment of abstract behavior, have also proven fruitful in the study of mental deterioration of other kinds. For, investigations by Vigotsky (68), and later by Kasanin and Hanfmann (41), Bolles and Goldstein (9), have shown that this type of examination could be successfully applied to certain types of schizophrenics. Since the problem has become of such a general practical and theoretical significance, it seemed advisable to prepare a manual on the Sorting Tests used by us and to present them with all the implementations which the experience of over twenty years of clinical work has evolved. In addition we publish here for the first time a psychological analysis of Goldstein's cube test (with the use of Kohs designs) and of the stick test with directions for administering all tests.

The tests are chiefly performance tests, *i.e.*, they exclude as far as possible a procedure *based* on language in their execution. The performance tests in common usage do this too, but mainly because one tries to avoid the positive effects of verbal training or the negative effects of its absence upon results in verbal testing. In other words the objective of the routine performance test is to determine the *actual* capacity of a subject which may not express itself in the same clear-cut manner on a verbal test. Our tests share this advantage of the performance tests. In pathological cases, however, there are other points to be considered which make the performance test especially superior to verbal tests:

a. *Verbalization and speech can be changed qualitatively to a high degree in a patient with a brain disease.* The patient may be able to utter the same words as the normal person does, but the meaning implied in his utterances may be quite different from the normal person's speech, without the observer's being able to notice this fact from the uttered or written words as such. In this way the patient may seem to produce a performance which

actually is not within his capacity. A patient may use words which, from the point of view of logic, seem to express a general concept; to him, however, the words have a definite, concrete meaning. A female patient with amnesic aphasia, for example, calls every presented object a 'thing' or a 'piece' (18). By this word she does not mean the inclusion of this particular object together with many other different objects under the class concept 'thing'; what she means is the total concrete situation in which she utilizes the presented object in a specific way; e.g., she calls an umbrella, a brush, a watch,—'a piece'; however, with respect to the umbrella, she adds: "A nice piece, when it rains you open it up, I have two pieces at home; I had three of them." When shown the brush, she says: "I know already what it is, where you can pass over one's hair." (She makes the stroking movements.) It is evident from this protocol and the accompanying pantomimic gestures that the patient does not use the word 'piece' as a class concept in the general, logical sense but that she says 'piece' to denote a concrete manipulative object in a situational context.

This holds, of course, for all cases in which amnesic aphasics utilize so-called circumlocutions. When, for instance, such a patient designates a pen as 'for writing,' a tape measure as 'for measuring,' a pair of scissors as 'for cutting,' he certainly does not mean by these denotations that the individual article belongs to the *class* of objects with which one can write, measure and cut. The meaning he wants to express is of a concrete situational nature; he means to say that one can manipulate this individual thing in this specific manner. (Therefore these patients more or less accompany their verbal expressions with vivid pantomimic gestures.)

For this reason one also has to be cautious when a patient uses a seemingly general name, e.g., the word flower, if faced with a rose, and, at another time, with a carnation, etc. We may illustrate the point by drawing on extraordinary circumstances in which the normal individual behaves in a kindred manner. If we lack the name for a rare object, for instance, a rare animal, we use the word 'animal' without meaning the general concept of the animal species; but we want to express something very concrete: the unreflected experience of this given entity. We behave in a similar way if a word fails us when we want to denote a definite concrete object which we ask for or which is handed to us. Then we also say 'flower' or 'thing,' to denote "this thing here" but not a species or class.

In this connection it is noteworthy that in the development of the child's language a similar phenomenon occurs. The child usually acquires expressions such as 'flower' earlier than the word 'rose,' 'carnation,' etc. This in no way indicates that the child already can intend a general class concept

with the expression "flower"; rather, he means something very concrete and definite—the situational valence of the given thing for which he has not yet acquired the specific term. William Stern (65) has emphasized that in this developmental stage the use of the individual word is in no way logically, *i.e.*, conceptually determined. The child does not have at his command any class concept in the adult sense. This developmental phenomenon is not yet entirely accounted for. Two factors may be noteworthy in our present state of knowledge.

1. As K. Bühler (12) has pointed out, the child uses verbalization to communicate his experience of expressive qualities or of a definite concrete action, but verbalization is not used in a *representational* sense; *e.g.*, if he has acquired a special word in the situation of picking flowers, he will, whenever brought again in the situation of picking flowers, use the same word no matter whether this word is rose or flower; for he does not denote with this word the object rose, but the act to which the word has become attached.

2. The adult tends to teach the child words which from his point of view are suited for application to different objects of the same class; therefore the word "flower" is in all probability taught before the words rose or carnation, so that the child will use this word in a concrete, situational sense without having grasped the class concept implied by the adult. Hence, in the early stages, the child acquires verbal expressions which, when viewed from the logical class aspect, *seem* to signify something general or categorical; in reality, however, they are nothing but a component of concrete situational *acts* in a realistic, non-abstract way. All this goes to show that one may overtly utter general names without having the meaning of the conceptional generality implied in these words.

This fact is of far-reaching importance, because it reveals that speech in general presents a certain ambiguity; an ambiguity as to the concrete or conceptual meaning of words. This ambiguity exists already in the normal person's verbalization and is accentuated in abnormal cases. It is therefore indispensable to analyze in each case the mental set—the attitude—from which the verbalization springs and to which it belongs.

We are stressing this point because it is easily overlooked in pathological changes of speech or of total personality. The ambiguity of language constitutes pitfalls for the application of verbal tests, especially to patients. Only by considering this ambiguity is the examiner safeguarded against misinterpretation and at the same time enabled to reconcile apparent inconsistencies in the verbalization of an abnormal subject. For example, a patient (70, *p. 1, note 3*) may impress the examiner with a pedantic meticulousness in

calling out the names of every shade of presented color samples of the same hue, e.g., red. One sample he calls paprika, the other peach, a third garnet, a fourth tearose—without ever using the general name 'red.' On the other hand, he may call a particular green tint 'green' and then *continues* to name further green tints by individualized, specific names such as: emerald, turquoise, chartreuse, olive, evergreen. The apparent meticulousness in the one case, and the use of the word 'green,' in the other case, may cause the examiner to assume that the patient possesses the concept 'green,' but that in the case of 'red' the patient has just behaved awkwardly, and does not lack the concept red. As a matter of fact the patient has no general notion of the color-category at all. He therefore can only name every individual shade without being able to apply the class name of the color-hue (red) to which the different shades belong; he has used the seemingly general word 'green' without any conceptual abstraction but simply because this given shade is the *only* one which aroused the unique experience connected with the *individual name green* in him. The use of any general color name, as red or green, does not indicate that a patient uses this word in a categorical way. *This has to be ascertained in control experiments;* (for instance, ask the patient to give the name which is common to all of the different shades of green which are presented to him, or to sort all "green" together, etc.).

For the above reasons our performance tests are devised to exclude and to check the ambiguity of verbalization which otherwise can become a fatal source of error in diagnosing.

There is another difficulty which arises from the verbalization of the patients. It consists in the fact that a dement or ament may exhibit an extensive vocabulary, a knowledge of routine phrases and a set of verbal responses, based upon a sheer extraneous drill and training, without really being able to understand the meaning these words imply in a general sense. The examiner can be easily deceived also in this case. A ten-year-old, feeble-minded boy was given the Binet subtest of enumerating all words he knew. He fulfilled the request rapidly within normal time limits, revealing a surprisingly well-developed vocabulary. The subsequent inquiry disclosed that he was unable to define the meaning of a great number of the words he had given. He simply knew them by heart from spelling instructions and pure rote memory. Let us illustrate further. A female patient published by E. Rothmann (61, p. 1, note 3) with a brain lesion was unable to produce words on command, even if specified as to class, e.g., "Give me animal names." If one, however, started her in calling out: "Cat, mouse, dog," she continued with, "ice-bear, brown-bear, lions, tiger." Asked why she picked these names, she explained that if you enter the Zoo (of her town) you

How do you "publish" a patient?

CONCRETE THINKING TYPE QUESTION

would pass the cages of these animals first. At another occasion, asked to enumerate Christian names, she promptly calls out: "Hedy, Erna, Tony, Paula." Inquiry reveals that these were the names of her sisters. Thus in both cases the patient did neither produce nor use the names "abstractly" as arbitrary classnames, but only "concretely" as individual names belonging to a definite situation.

b. *Our performance tests differ from the usual test procedure.* The tests of common usage apply a quantitative scoring in which success and failure are recorded in an arithmetical way as plus and minus. In our tests this method is applicable only to a very limited extent. The reason for this does not lie primarily in the fact that our tests have not as yet been gauged for quantitative standardization. The reason rather is a methodological one which is intimately connected with the nature of the case material to be examined with these tests: we are dealing with sick individuals, with defective human beings.

Due to this defect the sick person lives in an environment to which he is no longer adequate and which is no longer adequate for him, because it is the world of the normal. The sick person cannot cope with the demands which thrust themselves upon him. His capacity range is not up to answering the stimuli of the normal person's world with appropriate performances and responses. His feeling of inadequacy is incommensurately unpleasant in respect to tasks which appear commonplace to the normal. Viewed from the changed personality of the patient, however, this affect constitutes a justified catastrophic reaction.

In order to avoid such catastrophic situations the patient is dominated by an abnormally strong tendency to solve a given task or to get rid of it. He therefore will be driven to utilize roundabout ways or to use preserved capacities in a new way, if faced with a task he cannot cope with, because of this defect. Hence, from the mere extraneous result the task may appear to be solved, whereas the patient has not actually attained the performance effect by those means which the task really requires normally. In other words a patient may produce a plus from a point of view of quantitative rating without the capacity required for this subtest really being present or called into function.

Further, it must be considered that the world in which the patient lives has been transformed through his disturbance and has been modified as to his apprehending and conceiving. For instance, the normal person's perceptual configuration follows very definite laws as to the relation between the phenomenal figure and ground in correspondence with definite stimulus

constellations. These laws concerning a contrast of the figure against ground, its relief character, its stability, articulateness, etc., are characteristically modified in pathology. The modification tends towards a dedifferentiation of the normal figure-ground formation. The defective figure-ground formation can manifest itself in various ways and in different fields, e.g., in perception, in the motor field, in thinking, feeling, etc. The perceived configuration may become inverted as to figure and ground, or the normal relation between the two may be disorganized so that unessential details come into relief. Or the normal boundaries between figure and ground become blurred, e.g., in reading, the letters will not stand out sufficiently clear to be recognized, etc.

Therefore it may easily be that the patient's changed reactions to outer-world events and to the contents he experiences simulate an impairment of a special performance capacity; however, the actual operation of this capacity is merely covered up by a disturbance in another field or is only secondarily and indirectly affected by that other derangement; e.g., in the aforementioned difficulty in reading, the patient may give the impression that he suffers from alexia, whereas he is suffering from a defective figure-ground discrimination. For, if we color the letters or draw a frame around them or simply underline them, the patient can read. Why? Because either method has intensified the contrast between figure and ground.

It follows from these facts and considerations that, according to quantitative rating, a patient might produce a minus result on a subtest without the function presumably tested by the applied subtest necessarily being lacking and he might produce a plus result without the function presumably being tested necessarily being present. The examples which could be adduced against the inadequacy of the plus and minus method in pathological cases are almost innumerable and every examiner encounters them in the routine of testing patients of this sort. In order to make plain the above arguments against the plus and minus method, we shall substantiate them by a number of examples taken from different case histories.

A patient (63, p. 1, note 3) was given a sentence completion test of the following wording: Dear sister—(I)—inform you—(that)—I have received your—(letter)—. I am feeling—(fine)—. If you visit me during the coming month you would give me great—(pleasure)—.

Your—(brother)—

Ludwig

In spite of all kinds of prompting the patient failed completely. It should be noted however that the patient, at that moment, did neither have to answer a letter to his sister nor write to her.

Another day the test was:

Yesterday was—(a)—heavy—(thunderstorm)—. There was—(strong)—thunder and lightening.

The patient solved the task promptly. According to mere quantitative rating the patient's performance should be scored minus on the first and plus on the second application of the test. Both figures would, of course, contradict each other and offer no hints on the same type of test. But if we analyze these data qualitatively and are attentive to all the surrounding circumstances we will find the reason why the patient was *able to solve one and unable to solve the other task*. The day before the thunderstorm test had been given a thunderstorm actually had occurred. *To fill in a text appropriately* the patient had to be presented with contents which had a concrete, personal bearing on his present situation. A text which has not this appeal belongs to an abstract, discursive field of thought, foreign to his concrete frame of mind. It was impossible for the patient to find words for a text chosen at random and lacking immediate connection with his concrete situation.

The same patient, asked to say the alphabet is not able to do so, while in a writing test, seeking to find the letter "O," he spontaneously calls out the alphabet until "O" is reached. Does the patient "know" the alphabet? Quantitatively we ought to rate him once plus on the alphabet and once minus. In a reading test the patient's performance was fairly good. Closer observation revealed that before the patient called out the letter he wrote every presented letter with his fingers either on the table or in the air. If one prevented such writing movements by holding his arms, he was unable to say the presented letter or the word.

Another patient performs calculations quite correctly. Yet when he has to say how much four plus three are, he proceeds as follows: he says: one, two, three, four, pressing consecutively four fingers on the table at the same time. While keeping these fingers on the table, he again says: one, two, three, this time pressing three more fingers on the table. Now he counts all the fingers placed on the table: "1-2-3-4-5-6-7" and says: "four and three are seven." Closer examination, which we cannot give in detail here, brought out the fact that the patient has lost the concept of numbers and that without such concrete aids he could not even tell whether seven is more than four.

It is evident that in the last mentioned cases any rating based on the mere performance *effect*, be it plus or minus, would produce only senseless figures or confounding results. The reason is that a plus, i.e., an achieve-

ment correct *de facto*, may have been attained in quite an incorrect, abnormal way. The patient's pathology may consist largely of this abnormal procedure in roundabout ways. The disturbance may thereby be perfectly camouflaged. If the examiner orients himself merely by plus and minus scores, he will find, to his surprise, on different occasions, failure and success in the same or a closely similar task. This is the case when the experimental condition does not permit the patient to take his roundabout way, or when the task proper lacks the stringency of permitting only *one way of solution*.

For instance, in the subtest on the Binet scale which demands the finding of similarities between two or more objects a female patient behaved differently on different occasions (26). At one time wood and coal are found similar "because they both burn"; at a later date, however, she insists that they are totally different since one is brown and the other black.

Success or failure can depend upon the traits of the objects which happen to strike the patient at a given time. The apparent arbitrariness and inconsistency from the mere plus and minus point of view are resolved if one traces them back to the basic disturbance which consists of the patient's inability to *survey objects actively with the purpose of generalizing*; for this reason she is delivered to the similarities or dissimilarities as they were evoked by the names of the objects in her situationally-determined thinking. The same patient renders correctly to the smallest detail the designs of the Stanford Binet scoring card but is unable to follow even the simplest rules of selections in copying names from a catalogue, e.g., copying only the names marked or omitting the degrees following the names.

To summarize from this brief exemplification—which could be multiplied *ad libitum*: In pathology, test results can be evaluated only by analyzing the *procedure* by which the patient has arrived at his results. Any quantitative rating as to success and failure constitutes an infinite source of error, unless it follows a qualitative analysis instead of preceding the latter as it is often practiced. This is borne out by further differences between the findings in tests on normals and in tests on abnormals. The construction of the usual test for normals, consists of a scale of ascending steps of difficulty. These steps are meant to represent either progressing mental age levels (as in the Binet), or performance levels of increasing accomplishment. Therefore, in *principle*, a subject who has failed in a subtest which, on this scale represents an easier task, is expected to fail also on the subtest higher up on the scale.

The principle of graded difficulty presupposes that each of the ascending

steps represents quantitatively greater difficulty of performance. It presupposes at the same time that each step (*e.g.*, age level on the test) represents the same difficulty to the average individual (*e.g.*, of the corresponding age). The same holds for performance tests designed in steps of increasing complexity. Therefore the scores the subjects receive for their accomplishments in the different steps indicate whether or not one subject is better able to overcome the difficulties than the other.⁴ The assumption that the same step represents the same difficulty for the average subject tested may even be disputable for normals. In patients such a quantitative comparison is inapplicable. The steps of "graded difficulty" may represent for the patient a *qualitative* difference. A patient may fail in one subtest of a "lower grade" and succeed on a subtest of a higher order of difficulty, because the first task demanded a mental set which the patient is not able to assume on account of the qualitative change in his relation to the world. The step which seems to contain greater difficulties "objectively" may be solved by the same patient, because to his modified personality it represents the easier task (a task for which the patient's mental set is adequate).

We can exemplify this fact by the behavior of patients in a simple test situation. On the Kohs Block Test a patient may fail on the designs which are considered easier, whereas he succeeds on the design ranking higher on the scale of difficulty. This happens, for instance, in the case where a patient copies the first six designs correctly within the approximate normal time limits. However, when confronted with the 7th, 8th and 9th designs he fails, whereas he succeeds on the 10th and following designs. The reason is that designs 7, 8, 9 are not as the preceding ones, presented on a horizontal basis, but standing on an angle. The patient was not able to shift in his approach from horizontal to diagonal. Therefore he succeeded on design 10 and the following in which the horizontal presentation was restored (the usage of the term 'restored' is only a description from the patient's point of view; there are many normal subjects who scarcely experience this irrelevant change of position).⁵

Another example: A patient is given a set of sticks; he is asked to copy with these sticks the configuration the examiner presents with corresponding sticks. If presented with two sticks forming an angle pointing up, he fails; if however the same sticks form an angle pointing downward, he is able to reproduce them. He is unable to copy the position of *one* stick alone, no matter what direction, but if presented with a design of a house, built from sticks, he succeeds. Investigation discloses that, to the patient

⁴ This is the gist of standardization of tests.

⁵ This is a case of subcortical rigidity with intactness of intellectual function.

the angle pointing downward represented the letter "V," a content with which he could deal; whereas the angle pointing upward had no meaning to him. Therefore he could not come to terms with the configuration which demanded the understanding of "pure" spatial directions without any concrete bearing (one stick—abstract spatial relation). Objectively, the task of reproducing the house, which consists of 10-12 sticks, appears to be a more difficult, complex performance than the task of copying the position of a single stick. According to objective, quantitative scoring, the patient would have been considered failing in the simple task, and succeeding in the more complex one. However, to build the house presupposes a mental set on the part of the patient which is easier to assume than the abstract attitude required for the grasping of "mere" spatial position.

Taking this test result as illustrative of many others, we have to conclude: [the usual scoring method based on a scale of difficulty which has been standardized on a statistical basis offers no adequate instrument for determining the nature or the degree of impairment in a patient. Unless one takes into account the entire procedure, the specific reasons for the difficulty the patient encounters, one cannot simply read off from a score which task represents a greater difficulty and which a lesser. Any statistical evaluation has to be based upon a qualitative analysis of test result; qualitative has to precede statistical analysis.] First one must determine which kind of qualitative difficulty a task represents for the performance capacity of the patient, then one can make any quantitative inferences as to the degree of impairment, etc.

Much work has been done in recent investigations on the problem of scatter on the Binet Test; attempts have been made to develop methods by which one could read off from the amount of scatter the degree of deterioration. This approach leads essentially to nothing more than to a process of converting figures into other figures. The results are confined to the mind of the experimenter without the figures having direct bearing on the diagnosis of the patient's actual performance-status. This is true in principle for the corresponding attempts to utilize the I.Q. or M.A. of the patient as an indicator of the degree of his defect.⁶ Regarding this problem in normals, it may be of practical value to determine the levels of I.Q. or M.A. However, one should consider the results of recent investigations regarding the influence of environment upon the I.Q. of different social groups [*cf.* the critical discussion of Neff (57), the elucidating work of

⁶ Kent, Grace (42), especially pp. 393-400. "Our norms hold only for the group, not for every individual included in the group and not necessarily for any particular individual. . . . We have fallen into the habit of depending upon the norms to save us the trouble of making observations."

Klineberg (43), and others]. The validity of the I.Q. as a measure of an inherent intellectual span and the claim of its constancy are evidently under dispute.

The following case is an example (3) of the difficulties encountered in applying the Binet to a normal child living in an environment which differs from the standard milieu: Q.: "If you went to the store and bought 6 cents worth of candy and gave the clerk 10 cents, what change would you receive?" One alert young boy in the Kentucky mountains replied: "I never had 10 cents and if I had I wouldn't spend it for candy, and anyway candy is what your mother makes." The examiner, intent on finding out whether the child could subtract 6 from 10, reformulates the question: "If you had taken 10 cows to pasture for your father and 6 of them strayed away, how many would you have left to drive home?" A.: "We don't have 10 cows, but if we did and I lost 6, I wouldn't dare go home." The examiner reformulates the question again. "If there were 10 children in a school and 6 of them were out with the measles, how many would there be in school?" A.: "None, because the rest would be afraid of catching it too." The answer is undoubtedly determined by the special milieu and does not correspond to the statistical, abstract standards of the Binet. The answer, though "incorrect," displays such reasoning that qualitatively it should well be considered intelligent.

Apart from the literature which has accumulated on the technicalities of this question, we ought to point also to the misgivings of the anthropologists regarding the applicability of our intelligence tests to primitive peoples. Margaret Mead (52) relates her experiences with the ball and field test of the Stanford-Binet with Samoan children who failed on this test. Though, according to Western standardization it represents a fair measure of reasoning in a given situation, the Samoan children tended to handle the problem from an aesthetic rather than from a practical aspect. They endeavored to make designs which would in themselves be pleasing instead of solving the task practically. This seems to be commensurate with the cultural and social matrix of their milieu. The same relationship is evidenced in their response to two pictures emphasizing human beings. "No discussion could be commenced until the question of the relationships of the characters had been ascertained." These facts point to the same problem we have encountered in testing pathological cases; a mere plus or minus does not betray the capacity under consideration as long as one fails to determine the way in which the result has been attained.

From Mead's example, we are *not* informed that the children are lacking

in practical reasoning power: what we are informed is that the test did not measure practical reasoning in this case because the different milieu of the subjects did not allow for such an approach on *this test*. Comparatively similar conditions prevail in pathological cases, different only in that the mentioned milieu-differences on social grounds are here afforded by pathological changes. / Therefore, in both cases one has to vary the experimental conditions in such a manner that the required approach is actually or potentially within the subject's scope and no other way of solution is possible. Only then is one justified in drawing inferences as to the presence or absence of a capacity. Another problem of specific psychological nature is all too readily pushed aside in the comparison of the I.Q.'s. One easily overlooks that the same M.A. or I.Q. in two different individuals has an entirely different significance as to the qualitative performance capacity. For, the identical I.Q.'s are computed from quite different subtest-results in each of the two individuals. In patients the same rule applies in a more stringent manner and with more involved implications. The M.A. or I.Q., taken on a patient, especially if verbal tests are administered, represents a figure in which every factor contributing to its computation is derived from subtests. The results from each of these subtests, in patients, may deceive the examiner about the actually underlying capacity. The I.Q. findings in patients by means of verbal or performance tests suffer in principle from oversimplification. This testing method neglects the fact that an almost uncontrollable number of factors enters into the process of the test procedure. The effect is that the capacities underlying the subtest performances may be either masked, deflected, or not equivocally determined. For example, a patient may be rated very low because he could not solve the subtest in the prescribed time. If the time element did not constitute the measure of his accomplishment, he might easily comply with the requirement of the test. Therefore, the I.Q. based on such findings fails to do justice to the patient's *actual* capacity status. Recent investigations of the performance of schizophrenics in the Healy Completion Test showed that the patients would have failed completely on the standardized score (26). The qualitative analysis, however, revealed that the patients' particular solution of the problem was closely connected with their modified approach to space and imagined situations. They were well capable of realizing definite contexts imaginatively. Objectively, their failures consisted of a "disregard" of spatial realities, e.g., placing a clock in the sky. This was neither arbitrary nor senseless but fitted their conception of the story.

The conclusion to be drawn from these considerations is that only a

qualitative analysis can be instrumental in determining the nature and degree of a defect. This postulate entails the necessity of further substantiating what is meant by qualitative. In this respect we have already characterized as qualitative the indispensable scrutiny to be exercised in observing the particular way in which a patient proceeds in order to attain a result. But qualitative determination has to go beyond that. We have to devise special tests in which we can ascertain unequivocally the corresponding approach required for each task; *i.e.*, the solution must presuppose a definite attitude and the experimental arrangement preclude success by means of any other approach. From this standpoint many tasks which appear to be different in content and difficulty may presuppose the same attitude and make the identical demand on the subject. On the other hand, many tasks which, taken at their face value, appear to demand the identical attitude from the subject, may actually presuppose a qualitatively different attitude.

This fact implies that the measure of difficulty cannot be one of mere quantity, but has rather to be derived from the difference in quality between the attitudes called for. The subject encounters a greater difficulty in assuming an abstract attitude than a concrete. It is our assertion that the aforementioned differentiation as to abstract and concrete offers a positive dividing line between two attitudes of contrasting difficulty. Each of these attitudes correspond to a definite performance range. Tasks which presuppose the activation of the abstract performance-level cannot be genuinely solved as long as the subject operates within the confines of the concrete level.

THE ABSTRACT LEVEL OF BEHAVIOR AS A DISTINCTLY NEW LEVEL

There is a pronounced line of demarcation between these two attitudes which does not represent a gradual ascent from more simple to more complex mental sets. The greater difficulty connected with the abstract approach is not simply one of greater complexity, measured by the number of separate, subservient functions involved. It demands rather the behavior of the new emergent quality, generically different from the concrete.

From the evolutionary point of view, this behavioral quality would represent a recent achievement. Be this as it may, in any event we are dealing here with a "new" functional level, intimately connected with the intact working of the brain cortex (especially of the frontal lobes). It should be stressed that our entire conception of two behavioral ranges is based upon neurophysiological as well as psychological findings. The connection of "higher mental function" with the frontal lobes was brought out

in neurophysiological and pathological studies during the past two decades by Goldstein (22, 23), Brickner (11), Henry Head (30), Weisenburg and McBride (71), Fulton and his associates (*e.g.*, Jacobson) (16), and others.⁷

The abstract level is not simply a combination of existing lower functions in a next higher synthesis. And it seems also insufficient to characterize this level as the more complex capacity of synthesizing, or as the ability to shift and to perform a greater number of shifts. For, there is a decisive difference between active synthesis, active shifting, and a passive, global reaction to stimulus constellations or a passively induced change in reactions which only overtly coincide with the true characteristics of synthesizing activity and shifting.

Rather, the new functional level is characterized by the appearance of the paramount factor of *conscious will*. The authors cannot but maintain that this is the essential feat of abstract behavior—that any other kind of seeming abstraction which does not involve *conscious will* is not abstraction at all. This may run counter to the traditional theories of abstraction which can be condensed to the following explanatory principle, common to most of them: the reaction to a partial conformity of several objects of perception (so-called common partial contents) is preceded by a stage, in which these percepts are already experientially present as *definite objects* with a number of well-defined, given properties. Accordingly, the process of abstraction is said to consist of either voluntarily or *involuntarily* singling out, *i.e.*, abstracting the common, partial content from all the given properties of the various objects.

However, the experimental evidence from studies on perceptual stages in adults and in children fails to support the view that an object is perceptually present with all attributes in *immediate apprehension*. Primarily and unreflectively it is usually given as a configuration with one definite functional property in the foreground (46, 44, 65, 58, 53, 55). The so-called *involuntary* reaction to partial conformity of different objects occurs either in the case that the conformities are *sensorially* impressive (in the foreground) or in the case that the subject acquires the reaction through experimental *training*. In neither case is it necessary to assume processes of involuntarily abstraction as long as it suffices to explain the reactions as due to *phenomenal* groupings, be it that they arise spontaneously in response to the field or through a training effect. Crucial proof that an abstraction in the only possible sense of volitional abstraction has actually occurred, can

⁷ See also Halstead's paper (78) which came to the attention of the present writers after this manuscript went in to press. To the problem of shifting which Halstead emphasizes see page 100 of this monograph.

and must be provided by control experiments, e.g., on the ability to shift the common denominator under varied conditions or on verbalization of the common denominator.

From sorting experiments with patients and normals the same conclusion seems to be indicated. For instance, all the subjects were able to group together a variety of given objects of similar color or similar use. The experimental analysis, however, revealed that from both groups only the normals could account for the principle of their sorting and could shift spontaneously or on request the conceptual category of their sorting. This the patients could not do; in most cases even a suggestively arranged presentation of groupings other than those formed by the patients failed to yield an acceptance of such groups. The patients could not be prompted to grasp the basis of the articles belonging together in that way. Even the verbal explanation of the concept on the part of the examiner did not help them. Did the patients abstract involuntarily common partial elements in the first instance, but could not do so in the second? Closer experimental investigation revealed: What at first glance appeared to be "involuntary abstraction" turned out to be an entirely concrete procedure, determined by an unreflective apprehension. The patients responded to a definite organization of the articles within the purely phenomenal realm of immediate experience. This definite organization was either one of sensory cohesion, or of situational belongingness, or of co-functional, manipulative valence. Hence, whenever in these cases the sorting of materials seemed to point superficially to an involuntary process of abstraction, the analysis disclosed that a so-called involuntary process of abstraction does not exist. As a matter of fact, the subject responded to a configuration of articles which was thrust upon him as a palpable organization of materials in a definite grouping. This is a concrete and unreflective reaction and in no way guided or *interfered with by discursive reasoning of voluntary or involuntary nature*. It has to be recognized that any sorting which involves genuine abstraction is necessarily bound to a *conscious and volitional act of reflecting upon the properties of objects with reference to a concept, a class, or category*.

These statements apparently contradict the results of outstanding experiments on concept formation in adults and children, for instance the experiments by Hull (38), Smoke (64), Heidbreder on adults (32), and by Munn and Steining (54), Hicks and Steward (33), Thrum (66), and Ray (60) on children. In essence the results of these experiments seem to point to the following conclusions:

1. Among others there are certain subjects, adults or children who are

able to acquire the correct conceptualized response, but may be unable to verbalize the underlying principle of the generalization.

2. Concepts may not necessarily be conscious.
3. "The formation of the concept is usually not an end deliberately sought for itself. It has always been a means to an end" (Hull).

Topic 1. Before commenting on this statement we may mention that certain authors have paralleled the experimentally learned conceptual responses of human infants to the correct discrimination responses in experimentally trained animals. Thus one has spoken of a "concept formation of triangularity" in white rats (15) and chimpanzees (19). This is rather surprising in view of the fact that Koehler and others had already demonstrated correct responses to equal relations of varying absolute stimuli but did not advance the claim that the animals possess the "*concept* of brightness," or "*the concept* of relations." The fact that animals and human infants, at an early stage, acquire equivalent responses to triangles which differ in size, position, and background, should make us rather skeptical about the inferred conceptualization in both cases. It may be methodically important to consider the possibility that very young children, in experimentally induced situations, learn to react to common aspects on an entirely *concrete* basis, probably on a basis very similarly to that on which the animals responded correctly in parallel experiments. To support this view we may refer to the studies of Hobhouse (34). He called the animal's reaction to relations a "concrete acquaintance" with objects in relation, in terms of the total pattern. He disclaimed, however, that the animals were aware of the relations in the *abstract*.

A point in favor of concreteness of these learned reactions is the fact that the children with whom Thrum, Hicks and Steward experimented had similar difficulties in learning the meaning of "middle size" (boxes, etc.) as animals had in learning to discriminate the middle of three serial stimuli (69, 51). The "middle" of three stimuli of varying magnitude is much less likely to stand in perceptual contrast with others (*i.e.*, to be concretely impressive) than the two extreme stimuli, *e.g.*, big box-little box, to which correct responses could be learned easier. On the other hand, there are instances of true concept formation, especially at *later* age levels, although without verbalization in all cases. It seems to us that one may easily confuse the issue if one argues that, because no verbalization occurred, concept formation fails to evince the characteristics of conscious activity. In the first place all the mentioned experiments on humans contained a definite *instruction* or inducement. The instruction given verbally as a

class word or category, e.g., "give me the middle" (Thrum) or as a symbol (nonsense syllable, Hull); the inducement was to seek food (Gellerman) or to "get a green light" (Ray). In other words, a definite *activity* in a generalized direction on the part of the subject was called for by the experimental arrangement and during its course. If these experiments prove that concept formation had been attained—as they apparently do in several instances—then the result must have been due to a consciously initiated activity which sooner or later became oriented around a conceptual frame of reference. (The class word acquired a "meaning," or the material became conceptually organized.) That verbalization of the principle fails to occur in all subjects does in no way contradict the existence of conscious activity in a definitely generalizing direction. By no means do we imply that the conscious and volitional factor involved in abstracting operation must be inevitably accompanied by verbalization. True, verbalization is an index of a higher level of abstraction, but it is not the characteristic of every abstraction. This statement is corroborated by the experimental findings of Heidbreder (31) and Ray (60). More mature and brighter children (over six) as well as adults were better able to verbalize abstractions and their reasoning than were those under six and of dull intelligence.

Topic 2. The claim that concepts are not necessarily conscious is apparently based upon the mentioned absence of verbalization in some cases. In so far there seems to be no doubt that we can respond correctly on a conceptual basis without having verbalized that basis in our own mind. However, the absence of verbalization does not warrant the denial of an initiating volitional activity which had to be oriented toward a generalized frame of reference in order to evolve the concept in an experimental situation. The search for and discovery of the appropriate category, as for instance in Hull's or Smoke's experiments, may not always have been verbalized in the subject, but does this dispose of a generalizing act? Conceptualizing need in no way be identical with the conscious awareness of the *word* corresponding to the concept. Here the "word" is no more prerequisite than for the apprehension of relations for which an accompanying "verbal" consciousness has hitherto not been postulated. It seems rather fallacious to infer from instances of non-verbal generalization the occurrence of non-conscious, non-volitional, forming of concepts.

Topic 3. The process of concept formation during ontogenetic development, as Hull tried to model it in his experiments, is not our problem. How individuals acquire concepts during the course of their mental development is a rather intricate problem, and Hull's description is probably very close

to the fact: "A young child finds himself in a certain situation, reacts to it by approach, say, and hears it called 'dog.' After an indeterminate intervening period he finds himself in a somewhat different situation still, and hears that called dog also. Thus the process continues. The 'dog' experiences appear at irregular intervals. The appearances are thus unanticipated. They appear with no obvious label as to their essential nature. . . . At length the time arrives when the child has a 'meaning' for the word 'dog.' Upon examination this meaning is found to be actually characteristic more or less to all dogs and not common to cats, dolls, and 'teddy bears.' But to the child the process of arriving at this meaning or concept has been largely unconscious. He has never said to himself, 'Lo, I shall proceed to discover the characteristics common to all dogs but not enjoyed by cats and teddy bears'" (38, pp. 5-6). We have already referred to W. Stern and K. Bühler in this connection regarding the development of language.⁸ If one agrees upon the common assumption among many child psychologists that the child first uses the word in actual situations as belonging to these situations, then one has to conclude that the child does not at first use the word as belonging to a particular object or *class*. The word is rather attached to one experientially impressive aspect of or activity in the concrete situation. For example, Stern's daughter E. (age 1;7) called the points of shoes "noses" because she discovered she could pull on them like on the noses of her parents. Another child, according to Stern, said "lala" first to songs and music; after hearing soldiers march with an orchestra he also called soldiers "lala"; finally lala was any noise, tapping as well as being scolded. What Hull has justly termed "the child has a meaning for the word 'dog'" indicates however an entirely different level of activity than these former concrete stages of situational speech. Now the child has shifted in his approach; he is now able to *detach* the word from the concrete situations and to use it outside of these situations in the *abstract*, i.e., in an entirely new way. The word is now a *category* under which a number of things fall. True, this process need not be consciously verbalized. However, it requires a very definite activity involving more conscious effort than Hull may have it. We can only refer to the numerous examples in the child-studies of Bühler, Stern, Koffka regarding the period of "asking questions" and of the discovery that "everything has a name" in the child's development. Without developing the abstract attitude as a conscious volitional activity, the child could never obtain concepts. The fact that this activity is actually *interwoven with other activities in the*

⁸ See page 12 of this publication.

normal child may becloud the issue in question, that we are dealing with an *active* intellectual but not with a passive process of mere conditioning.

The following examples may help to bring out the issue more pointedly. W. Stern (65) reports: A 4;3 year old child was able to count. Asked how many fingers he had, he answered: "I don't know; I can only count my fingers." The number concept was not yet present in the abstract, although the child could count. Stern's daughter, age 3;7, counted correctly the fingers on her father's hand up to 5. He then asked: "Hence, how many fingers are there altogether?" The child could not answer and started counting again. The last finger is the fifth all right in counting, but not as yet the sum 5 in the abstract as a representative of the number of fingers counted. Her brother at the age of 1;7 *discovered* the "similarity" of different doors in this way. Pointing to one door in the room he asked: "That?" The parent said: "Door." Then he ran to a second and a third door of the room repeating each time the same question and receiving the same answer. The child behaved in the same manner with regard to *seven* chairs in the room!

Experimental studies of Welch and Long (72, also cf. 73, 74, 75) have demonstrated during hundreds of trials the extreme difficulties encountered in conditioning infants and young children to make "conceptual responses" and evolve or accept hierarchic concepts. On the other hand, if the appropriate maturation level has been reached, the same process is possible. In the normal child it may not be always so obvious. But who was not impressed with the description of how Helen Keller discovered that cold water in her right and a factual "sign" in her left hand had a relation: the relation between name and thing? And how Helen Keller thence proceeded to touch everything on her way home from the pump and to stretch her other hand out to Mrs. Sullivan demanding she should "give" her the "word" (in touch alphabet)? It is this *activity* which in the normal child blends with others. We know, however, that certain groups of feeble-minded children never acquire the "meaning" of a word in a conceptual sense and that certain aphasic patients lose this meaning of words.

In our tests the task is so elementary and simple that there can be no doubt about such a condition: a patient cannot sort colors or equally shaped figures together on request; nor can he accept such groupings; neither does he understand the given explanation; nor can he give an account of his concrete grouping; he also fails on request to shift this

grouping to another form. Here we meet a condition in which these criteria of abstraction are wanting: the ability to assume the abstract attitude, *i.e.*, to carry out a conceptualization by conscious volition. The fact that the patient cannot verbalize upon the most elementary groups is here also significant because every normal individual—even a deaf-mute child—possesses these basic categories of like shape and color.⁹

The results obtained in these investigations with sorting tests are paralleled by numerous other experimental findings, *e.g.*, with the Weigl, the Stick Test, the Vigotsky, the Feature-Profile, the Goldstein-Scheerer Cube Test, etc. They are further confirmed by other pathological data on the difference between conscious, volitional and concrete behavior as in disorders of speech, of imagery, memory, and in apraxia.¹⁰ This difference between the concrete and abstract behavior is unearthed in psychopathology but is concealed in the normal individual. In his total behavior both activities are intertwined in a fluid relationship. Only when we scrutinize the texture of his actions do we realize the presence of both components. A great part of our daily activities runs off on a concrete basis which consists either of an unlearned experiential unreflectiveness or of acquired performances which do not need conscious, volitional activity. Abstract behavior as an indispensable factor is brought into play whenever the situation cannot be mastered without the individual's detaching his ego from the situation. This conscious volition initiates the required performance or its shifting and if necessary controls its further course. We have many striking instances illustrating this point in our daily activites and also in the psychology of productive thinking. A recent survey of 200 introspective reports (39) on this process and on problem-solving experiments demonstrates that the "shift" or reorganization which leads to the solution is frequently experienced as sudden and passive. It may occur long after the direction giving conscious volition has been enacted. But it is by this act that the process has been set going; and only by virtue of such an act in the new direction can the shift be *grasped* in its significance for and applicability to the solution.

TESTS OF ABILITY TO ASSUME THE ABSTRACT ATTITUDE

There is a definite dividing line between the capacity span of the normal and that of a patient with a functional disturbance of the brain cortex.

⁹ Cf. the findings on deaf mute children with the Gelb-Goldstein Color Sorting Test (4).

¹⁰ See literature references on page 1; also Bouman, L., and Grünbaum, A. A., Experimentell-psychologische Untersuchungen zur Aphasie und Paraphasie, *Z. ges. Neurol. Psychiat.*, 1925, 96, 481-538; and Grünbaum, A. A., Ueber Apraxie, *Zentralbl. ges. Neural. u. Psychiat.*, 1930-31, 55.

The latter has become limited to the concrete approach and is handicapped if he has to perform or to shift by an act of conscious volition. If this be true, tests that permit us to rate the performance of a patient according to this line of demarcation would have a diagnostic value of practical and theoretical import. It is our belief that the technique of our tests enables the examiner:

1. To determine whether a patient can or cannot assume the abstract attitude.
2. To study his particular procedure with respect to the specific type of concreteness to which he is confined. The evaluation of the test may further enable the examiner to provide a fair measure as to the degree of the impairment. As has been pointed out in the beginning there are various degrees of both concrete and abstract behavior. Therefore the examiner can draw inferences as to the degree of the defect from the following findings: (1) The patient is entirely unable to assume the abstract attitude. (2) The patient is confined to the lowest type of concrete behavior. (3) His performance range covers the lower and upper grades of concrete behavior. (4) He is able to conform with only some of the tests which demand abstract attitude. (5) He cannot learn even if all aids are given.

At present we are not able to elaborate a definite scale of tests graded according to a more or less concrete and more or less abstract attitude involved. Some of the tests, as for instance the cube test, lend themselves particularly well to such a gradation.

Before we go into the description of the tests proper, we should like to emphasize the following points:

1. The instructions given should not "tie" the examiner in the same way as in the usual standardized tests. On the contrary, we recommend that the examiner, after having administered the tests according to instruction, should feel free to vary the experimental procedure according to the need for further clarification.
2. It is advisable that every subject suspect of impairment of abstract attitude be given the entire test series. Experience with numerous cases has taught us that a patient must not necessarily perform consistently in all tests: a partial success in the first given tests may be followed by failures in subsequent tests and *vice versa*. Indubitably there is some impairment if the subject fails even in only one of the tests (*cf.* No. 4). For the following reason, it is also further advisable to administer the entire test series instead of a selection. Comparative analysis of the different achievements

of the subject in all tests provides a broader and sounder basis for evaluating the degree and nature of the defect.

This manual consists of the following tests:

The Goldstein-Scheerer Cube Test

The Gelb-Goldstein Color Sorting Test

The Gelb-Goldstein-Weigl-Scheerer (GGWS) Object Sorting Test

The Weigl-Goldstein-Scheerer Color Form Sorting Test

The Goldstein-Scheerer Stick Test

THE GOLDSTEIN-SCHEERER CUBE TEST¹¹

BEHAVIORAL ANALYSIS

The two approaches. The purpose of this test is to determine whether the subject is able to copy colored designs with blocks. These blocks are colored cubes. Each of the cubes bears the same colors in identical arrangement and distribution on all six sides. Each of the four sides bears one of the following colors: blue, red, yellow, white ("one-color sides"). Each of the two remaining sides bears two colors, one blue/yellow, the other white/red in a half and half arrangement with diagonal partition ("two-color sides"). The instruction is to copy the designs with blocks (Samples 1 and 2, and Cards I-VIII) with 4 blocks, Cards IX-XII with 9 blocks, the rest with 16 blocks).¹²

To reproduce the design, two types of approach are possible, a concrete and an abstract.

In the concrete approach the subject carries out instructions by entering the situation in which he responds unreflectively to the task of "copying." He does not consciously give an account to himself of how he proceeds, he is rather given over passively to the immediate impression of the design. The subject does not attempt to detach himself ("ego") from the contents of his immediate apprehension and does not reflect upon his doing.

In this concrete approach, the subject depends upon his figure-ground impression as suggested by the model. He seeks to reproduce that impression with the blocks by manipulating and turning up their sides until he experiences that they match the figure of the model. Therefore he does not match the block-sides to separate parts of the design by a piecemeal and one-to-one comparison; rather his procedure consists of forming a block-pattern by a "total matching" oriented by the design as a whole. He unreflectively apprehends the design as a figure-ground coloration *in toto*, and his procedure of copying follows the design without a deliberated act of analytical reasoning. He does not premeditatively break up the design into four separate parts and then seek the corresponding block-sides, but he tries to reproduce his impression of a coherent figure and ground formation by the above naïve "total matching." There are, of course, variations of

¹¹ With the use of Kohs designs based upon the investigations by Goldstein and Scheerer, Bolles, Nadel.

¹² The card numbers used in this behavioral analysis are the same as used by Kohs. The designs and numbers to be used in the instructions will be presented later.

this procedure; the subject may not always carry through the pattern formation by a *total* matching because he is more impressed with the figure irrespective of the ground, or with a "sub-whole."¹³ In these cases a partial matching occurs, which still is not piecemeal, but is guided by an unbroken partial figural aspect (sub-whole).

The description of the subject's manner of approach, as a total or partial matching is derived more from a behavioral analysis, than from introspective data. Any careful observer, who watches what the subject actually does with the blocks, can read off from the behavior of the subject whether he follows an analytical or matching procedure. The observer at once recognizes whether the subject builds a "pattern" in the sense of total or partial matching, or whether he constructs analytically block-square after block-square, in correspondence to those square units to which he broke down the model. In the first instance, the block-sides which the subject brings together definitely reflect a figural element, and it is not at all arbitrary where the subject begins his building of the block pattern. In the second instance, there is no patterning, and it is quite irrelevant to him, where, at which corner, he begins.¹⁴ Reproducing by the *matching* procedure, however, is limited to only a number of the models which may vary with the different individuals. There is a definite turning point in the normal subject's approach. This occurs when he encounters a difficulty in carrying on with his naïve approach depending upon the unbroken figure of the design. The difficulty arises at the moment when the design of the model presents a configuration which requires a handling of the blocks in a different way: no longer can the subject turn up and arrange the sides of the blocks according to a simple experience of total-matching-or-not-matching of his block pattern with the figural aspect of the model. In his total matching, he encounters real obstacles; there are too many incongruencies between the one-color sides, the two-color sides he turns up, and the figural aspect of the model he tries to follow *in toto*. The arising confusion can only be solved by a *shift in attitude* to the problem—an *abstract approach is required*. The design has to be broken up imaginatively into four squares (with the models after card IX, into 9 and 16 squares). For each square the corresponding block-side has to be found, and the required design has to be constructed by single block-sides. Numerous experiments with patients and normals have proven that this approach demands and presupposes on the part of the subject the following abstracting operations.

1. a. To disregard the given size of the *design* and to translate the given |

¹³ Cf. Wertheimer, M., in 14.

¹⁴ For control experiments see page 39, No. 5.

size into a larger area, namely that area which the four *blocks* together occupy. (The total area of the *design* is equal to one block, i.e., one-fourth of the area covered by the four blocks in the final reproduction.)

b. To disregard the total configuration embracing the *design* and the white card area as one "thing."

c. To disregard the figure-ground relation within the design proper and to destroy it ideationally, dismembering it into new mosaic elements. To break down the coherent total impression of the design by articulating it into imaginal squares.

| 2. To impose an imaginal network of equal squares upon the design. This network as an articulation of squares cuts through the "natural shape" of the design, not demanded, but rather impeded by the design. To translate the so isolated, imaginal squares into squares, made of *block-sides*.

| 3. To hold in mind these imaginary square units and to match the so isolated "unnatural units" of the design with the turned up block-sides. These latter often consist of two-color block-sides, difficult to identify as corresponding parts of the design of the model.

| 4. To organize the so searched and identified block-sides according to a constructive principle. This principle involves two directions:

a. To organize the block material in conformity with the squares into which the design was broken. This often runs counter to the dominating impression of the figure, so that the subject may have to start with a block-side which corresponds to an "unnatural" part or corner of the design, comprising half figure and half ground in one, etc.

b. To reorganize and to re-integrate the block-sides into a pattern which corresponds to the design as a whole.

| 5. To detach one's ego from the immediate and primal impression of the model as one unreflectively apprehends it; to wilfully assume the mental sets as described under 1-4, as a formalized and conceptualized procedure, and to account for it consciously.

Many a mistake in the copying procedure of "normals" can be traced back to the failure to comply with one or more of the above-listed requirements; i.e., the subject fails to assume the required attitude in his approach. However, in principle, the normal is able to adopt these required mental sets and to shift from the concrete to the abstract attitude whenever necessary or when induced to do so by prompting.

Patients suffering from functional disturbances of the brain cortex are not able to adopt the specified abstract attitude required in this test. They therefore fail this test either from the first model on, or are unable to

copy the designs following the cards which they could copy successfully. In their mistakes and failures, they show any one of the following characteristics which correspond—in a negative sense—to the above-listed prerequisites.

TYPICAL FAILURE-RESPONSES TO THE PRESENTED MODEL

1. *Concrete dependence upon size* and inability to abstract from it. The difference in size constitutes a serious difficulty for certain types of patients and normals. Normal subjects with a preference for a concrete procedure

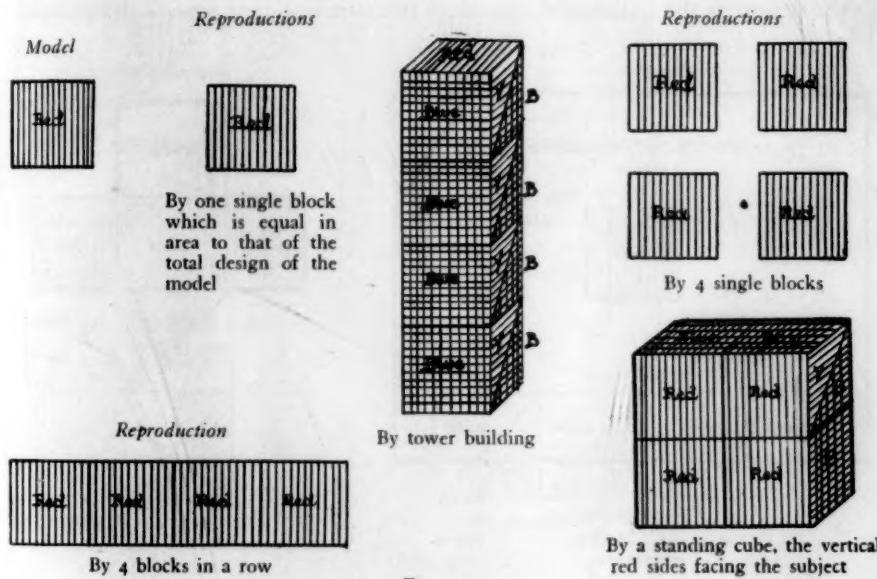


FIG. 1

encounter difficulties, being impressed by both the figure and the actual size of the design; they may fail on a simple model like sample I (red square, Fig. 1). For example a very intelligent normal did that design by turning only one block with its red side up and leaving the three other blocks unused. He reproduced what he saw, in its actual size. Another normal built a tower by putting one block on top of the other and the top block with its red side up. In patients the same phenomena of concreteness are manifest, but with them they are unalterable. The normal, of course, can easily overcome this difficulty and change his manner of approach. One type of extreme dependence upon size, confined on the whole to patients, expresses itself in building the pattern with the blocks on top of or close to the card; e.g., some patients place one single block on top of the model

"covering" so to speak with one identically matched block-side (for example, red) the design. It also occurs frequently that the patient begins with a reproduction by one block and then adds the other 3, each spatially apart from the other. That is, he repeats the model four times because he has been told to use four blocks. Or he places one block after the other in one row (Figure 1).

2. *Concrete dependence upon the total configuration* consisting of the subject of the *design* together with the white surrounding field of the *card* upon which it is drawn. The patient is unable to differentiate between the design as the figure, and the white surrounding card area as the ground.

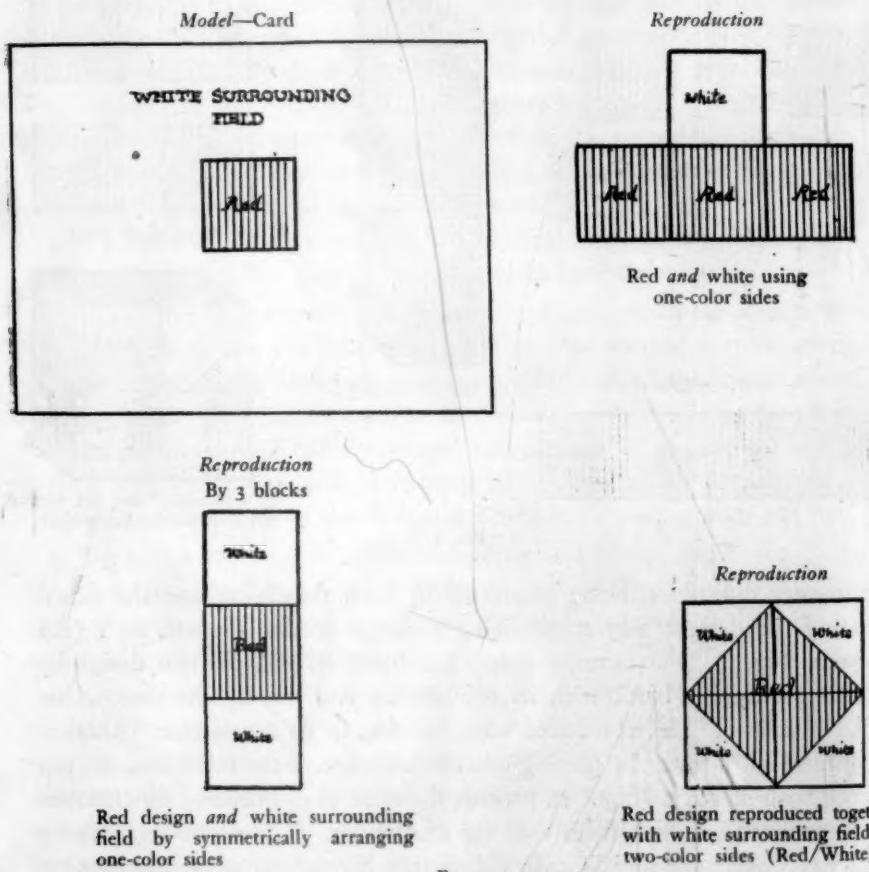


FIG. 2

Therefore, he may in some cases reproduce both the design and the white ground. This is evidenced in performances on sample I (red square) of

patients who place one block with the red side up and add to it one or more white sides of other blocks; or patients may form a block pattern in which the center is red surrounded by white¹⁵ (Figure 2). Reversals of figure and ground may also occur so that the position of the colors on the model is reversed in the final reproduction, e.g., white in the center and red around it.

3. Concrete dependence upon one global impression of the design—without articulation of parts; e.g., the patient is impressed by the "striped-

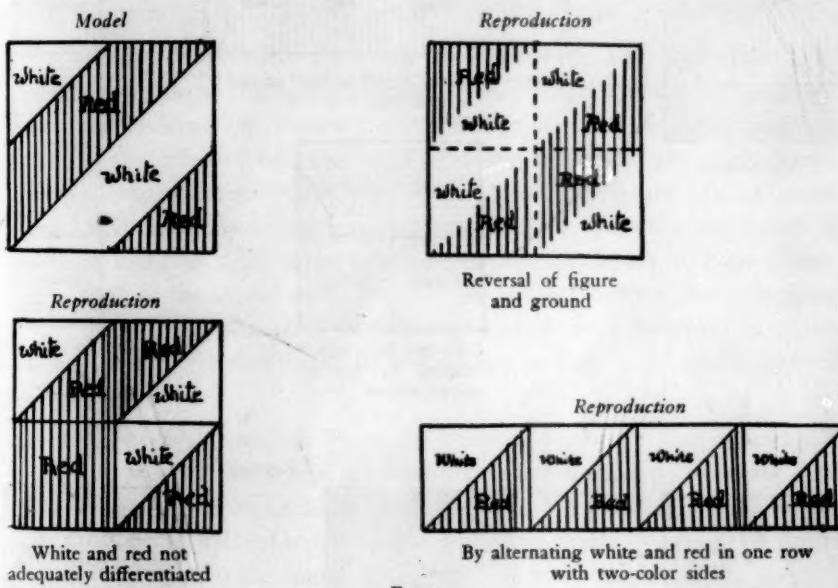


FIG. 3

ness"—of the white-red striped card V, and is unable to differentiate this general impression into what is figure and what is ground. In this case it is difficult for even the normal to decide whether the white or the red stripes represent the figure. This uncertainty among normals does not affect their proper recognition of the relative positions of the colors. The patient is subjected to this uncertainty to such an extent that during his trials an ambivalence as to the relative positions of figure and ground is manifest or that his final reproduction is a reversal of the red and white. Dependence upon the *global* impression of the model without correct positional articulation of parts may also express itself in forming one row of alternating white/red with two-color sides (Figure 3) or one-color sides (Figure 8).

¹⁵ This may occur also in normals of a highly concrete type; of course, they are able to shift their attitude.

4. *Concrete dependence upon the "impressiveness" of certain color aspects* of the design, so that the patient seeks to reproduce his color impressions alone, without being able to grasp their positional relationship or the figure to which they belong (*e.g.*, on samples I, II and cards IV, V, VI). The patient may reproduce only the red color or only the yellow or blue colors

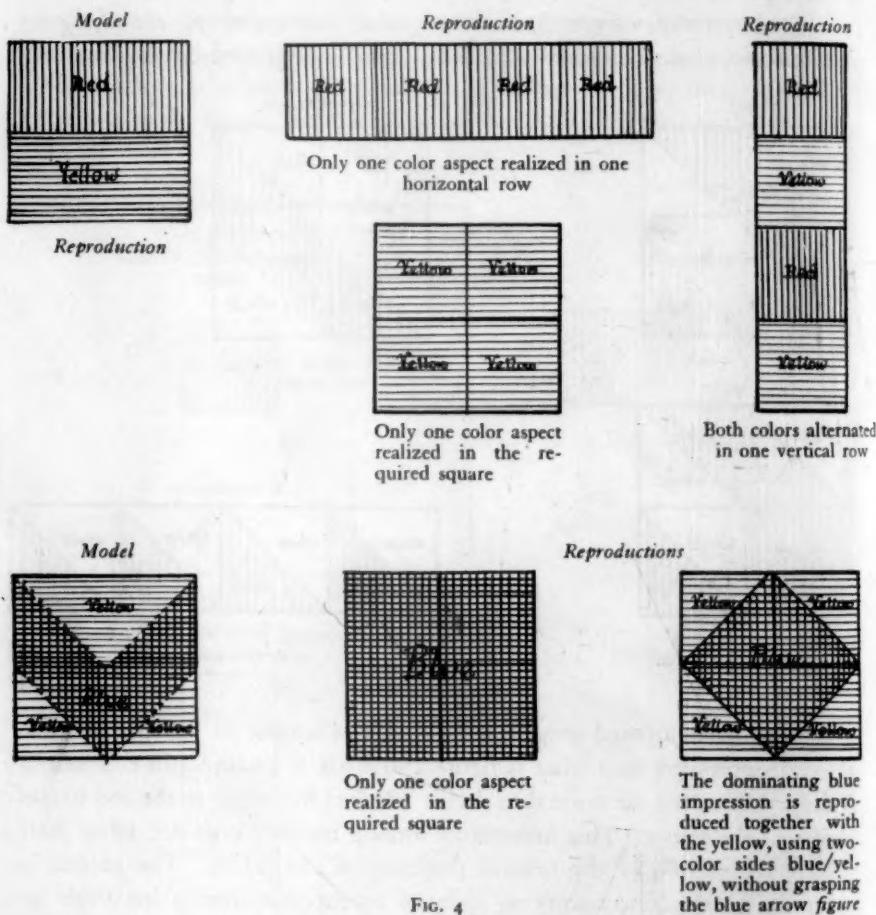


FIG. 4

by placing one-colored sides in a row, in a square, etc.; or the red *and* yellow colors are lined up one after the other; the patient arranges the turned-up block-sides in a row alternating the colors and using one color block-sides (Figure 4). These failures may be also attributed to the patient's inability to deal with two different impressions or aspects at the same time, so that he can only "realize" one at the time. Even if he succeeds in taking both

colors into account, he then cannot simultaneously master the structure of the *figural aspect*.

This dependence upon one sensorially manifest color aspect expresses itself in another abnormal patterning of the blocks, where the positional relation is not grasped. The patient arranges the blocks in such a way that the predominant color is reproduced on the vertical block-sides *facing him* rather than in the horizontal plane as per instruction. This shows that we have been precise in speaking of block-sides rather than blocks which form the basic units in the subject's manipulations (Figure 1, standing cube).

5. *Concrete dependence upon the impression of the figure*, and the inability to break up the figure ideationally into single squares. The patient either makes incorrect responses or cannot proceed at all at the instance when his concrete procedure of total matching can no longer afford him a successful reproduction. The dependence upon the figure can be ascertained experimentally by interrupting the subject's following the figure in his block building. The examiner then directs the subject to copy a non-figural part of the model or to begin at an arbitrary corner, not belonging to the figure. An abnormal subject will now show a handicap in reproducing the same model which he could copy as long as he could proceed by figural matching.

6. a. *Concrete dependence upon the factor of position*. The patient may succeed as long as the design is presented on the horizontal base, but fails if the design stands on an angle (*i.e.*, the cards VII, VIII, IX). This difficulty is intimately related to the concrete dependence upon the position of the design in relation to the spatial form of the surrounding field, as described under (2). For, in many cases where the patient is not able to copy the design standing on an angle, he may be able to succeed if the examiner surrounds the design with a white field, which has the same form, *i.e.*, which also stands on an angle. For the purpose of experimental control, we enumerate the following possible variations in presenting the design and the surrounding field (ground)¹⁶ (Figure 5).

Design	Surrounding Ground ¹⁷
1. Standing on a horizontal base	Same position
2. Standing on a horizontal base	On an angle
3. Standing on an angle	On same angle
4. Standing on an angle	On horizontal base

¹⁶ By "surrounding ground" is meant the white ground surrounding the design in contrast to the ground within the design.

¹⁷ This can be formed by using different white frames, *e.g.*, masks to vary the positional relation between the design and the card. (See Figure 5.)

There seems to be an increasing difficulty for patients to proceed from the first to the fourth task. This increase in difficulty is determined by two factors, (a) whether the position of the design is on an angle, (b) whether there is incongruity between the position of the design and of the surrounding ground. The difference in results on the forementioned variations (longer time needed) indicates that the angular position appears stranger to the subject than the position on a horizontal base. Position on a horizontal base—of such figure—is more natural, more concrete; it falls within the range of what the Gestalt psychologist calls "the law of *pregnanz*" and what we like to call "preferred configuration or position." If this preferred configuration is changed or interfered with by incongruity in positional relation between the figure and the surrounding ground, the performance is made more difficult.

Masks for varying positional relation between design and "surrounding ground."

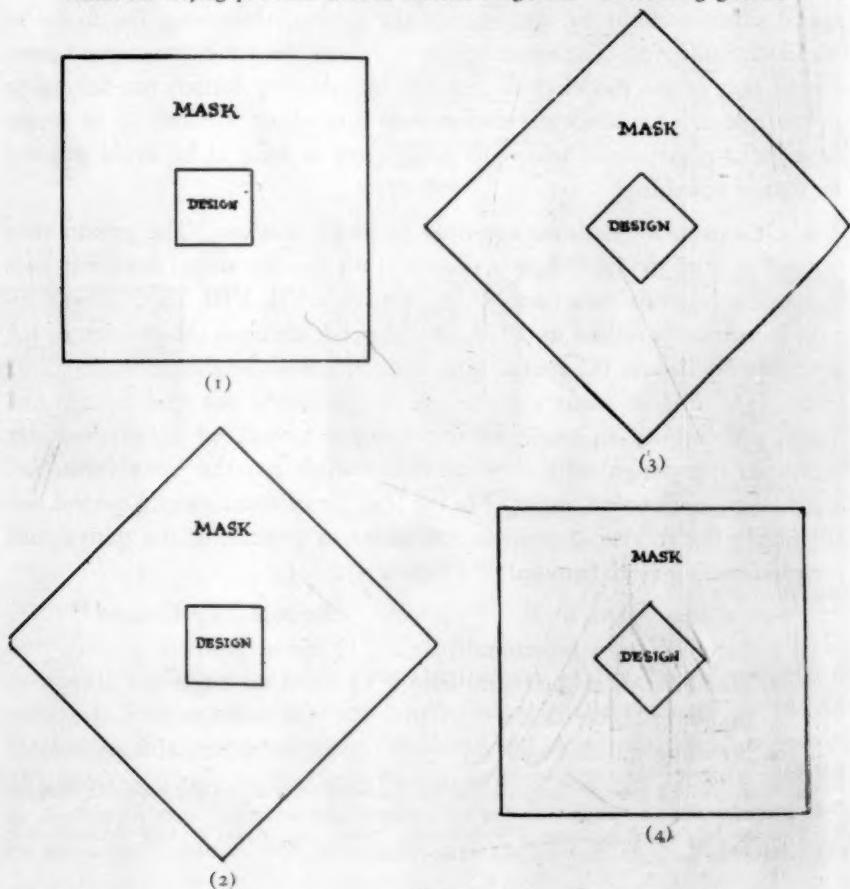


FIG. 5

6. b. *Dependence upon the factor of position due to rigidity* in voluntary action, not due to abnormal concreteness.

Certain types of patients suffering from postencephalitis and similar subcortical ganglion disease show in this test rigidity and delayed shifting responses. These symptoms are particularly marked with regard to the changes of the model in position; e.g., after the patient has successfully completed samples I and II and cards I to VI he fails on designs VII, VIII, and IX,—the reason being that the designs up to VI were all presented on a horizontal plane and III-IX on an angle. The subsequent designs where the figures are on a horizontal plane could again be solved by the patient. This result indicates that the patient does not suffer from an impairment of the abstract attitude since he is able to reproduce almost all designs. What his pathology results in is a primary lack of flexibility and of the capacity to shift in a limited amount of time; if given sufficient time, the patient may solve the problem.

TYPICAL FAILURE-RESPONSES TO THE MANIPULATIVE BLOCK MATERIAL

1. *Concrete tendency toward "preferred configuration" of shape or color* formed by the blocks as these aspects force themselves upon the patient while he turns up the various sides.

Example 1: Subject forms a triangle with the broad base instead of with the angle as base, as required by the model (Figures 6 and 7).

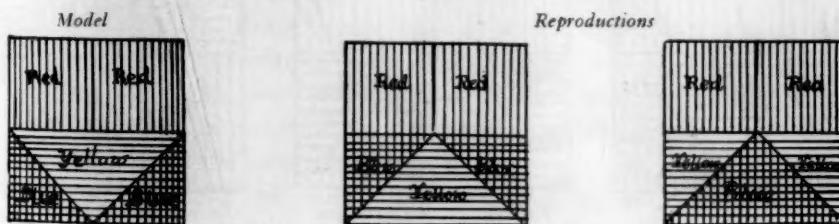


FIG. 6

Example 2: Frequent reversals of figure and ground favoring more symmetrical and balanced configurations caused by the tendency of the subject to produce those configurations which are simpler (Figures 6, 7). This tendency manifests itself in the patient's inability to reconsider, or control, such formations with respect to their conformity with the design. This may go so far that the patient recognizes the lack of conformity between the block pattern he formed and the design, but he cannot destroy this preferred configuration. We are therefore speaking of preferred configurations in the sense of being simpler and better balanced for the subject. What is simpler depends in each case upon the patient's personality and type of

defect. For testing abnormally strong tendency towards preferred configuration it is advisable to use a special design as, for instance, a design of the size of one block containing two colors, such as blue/yellow with a diagonal partition.  The patient may tend to reproduce this as follows  with one block, thereby preferring the horizontal partition to the diagonal. The patient's tendency toward preferred configurations in the sense of being simpler, easier, better balanced *for him*, manifests itself in a variety of distortions of the model. These distortions are the product of the individual patient's effort to come to terms with the task of copying the model. Owing to his defect, he can only discharge this task on an abnormally concrete level of perceptual and ideational organization. Owing to the nature of the defect and the personality of the patient, certain organizations will be possibly preferred. Such are: placement in a row, horizontal or vertical (as if the patient told a story: There is red and there is yellow); joining block sides according to prevalent sensory impressions, color cohesion or simpler figural coherence; patterns of one-color sides or two-color sides exclusively.

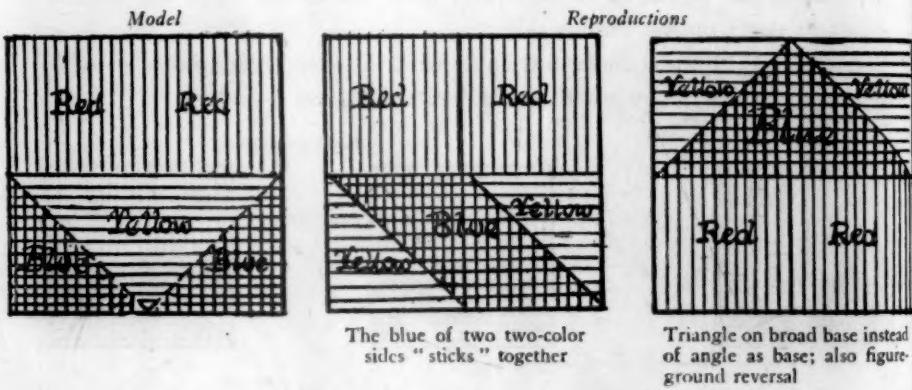


FIG. 7

2. Concrete dependence upon sensory cohesion. Like colors of two-color sides may come into visual contact, join together, while the patient manipulates the blocks; e.g., if two half-red or half-blue sides phenomenally happen to border on one another, the patient may place these sides together in his patterning of the blocks as being pertinent. (Figure 7.) This forcible sensory cohesion can appear as a *transitory* phenomenon, though blocking the smooth progress in reproducing the design: The patient sticks to this cohesion or reverts to it over and again. It can appear as a *final* solution and exercise such influence upon the patient that even after he has recog-

nized the incongruence between his block-formation and that of the design, he still cannot overcome the difficulty of destroying that color unity. There is no question that in most of the cases this dependence is closely connected with the tendencies toward preferred configuration as they are experienced by the patient due to the nature of his pathological condition. It should be noted that there are also instances of a more accidental cohesion resulting from the patient's trial and error manipulation with the block-sides.

3. *Concrete dependence upon the experienced uniqueness of a given aspect of the block material; subsequent inability to detach oneself from this uniqueness and to deal with one block, with a one-color side, or a two-color side in a generalizing way.* In responding to such an aspect in a concrete manner, the patient does not deal with it as being present four times. But he submits to it as a unique occurrence, instead of handling it as a representative of four equivalently available properties—according to the number of block-sides and blocks.

a. *Patient depends upon the concrete uniqueness of one block. Example 1:* He has composed successfully a partial pattern with two blocks and tries to complete it with a third block; but after he had not found the correct matching block-side on this block, he places the latter close to the space where he manipulated it in his pattern, so to speak, as "reserved" for that specific place. Then he reaches out for a new block which he now begins to match to another part of the design at another place of his pattern. Whether successful or not in this attempt, he will again turn back to the former block at the reserved place. This signifies that for the patient in this case the blocks have each served as an individual thing, fitting one specific purpose so that he "reserved" one block for one purpose while using another block for another purpose.

Example 2: After the patient has succeeded in partially composing and matching the design with two or three blocks, he proceeds in one of the following ways: (a) Seeking to fill out the remaining gap, he selects a hitherto unused block. He turns up one or more of its sides to match the unfinished part of the design. If, for one reason or another, the sides he turns up fail to match the remainder of the design, he does not continue to turn up all the other sides, but removes that block and selects *another*, a "new" one, repeating the foregoing procedure. (b) He turns up one or more sides of the hitherto unused block, and for one reason or another, one turned up side is correct but not in the proper position. Now he does not adjust that position, but he removes that block and selects *another*, a "new" one, repeating the foregoing procedure. (c) He turns up *all* sides of the

hitherto unused block and fails to identify the correct matching side on this block.

It should be noted that in this case as well as in the aforementioned instances he does not further concentrate on this block, but puts the block aside and reaches out for a "new" one. If his composition already had two blocks, he may leave these intact and reach for a third and then for a fourth block. If his composition had three blocks, he may even destroy that composition of three blocks and use any one of them, because after having manipulated block 4 in vain, no further block is available.

The examples of dependence upon the concrete uniqueness of one block indicate that the patient lacks a true understanding of the fact that each block is identical to all others, that each block of the four given him has the same combination of colored sides. This may occur, although the patient has successfully acted in accordance with the initial directions—confirmed by the following: (1) Throughout the test he had used all of the four blocks in trying to reproduce the design; or (2) he handled all four blocks appropriately in some other phases of the test. From superficial observation the examiner may erroneously infer that the patient has just "forgotten" that part of the instruction referring to the equal distribution of colors on each block. This is not the case. Because an understanding of the *principle of equivalence* of all blocks is lacking, the patient reaches out for a "new" block if the selected block did not yield satisfactory matching results. In order to have this principle in mind constantly, the subject has to be able to abstract from the given block—in this case, the one he is handling—and to generalize its distribution of colors with respect to the other blocks. A person who is not capable of this *conscious realization* may at times act in accordance with the equal color distribution on all four blocks on a concrete basis, but is not capable of holding in mind the fact as a general principle of reasoning. Therefore, he easily falls into the concrete apprehension of dealing with one particular block as having unique properties; he has the tendency to expect that another block has other properties among which the property he seeks may be represented.

b. *Patient depends upon one-color sides* (Fig. 8); he tends to use blocks with one color-side up because this is easier for him. It should be kept in mind that the use of one-color sides is not, as it superficially appears, a thinking in squares on the part of the patient; rather he translates his color impressions into that choice or arrangement of blocks which is the simplest for him; this simplest form is offered by use of one-color sides. In doing so he need not break up the material into real squares and their subdivisions

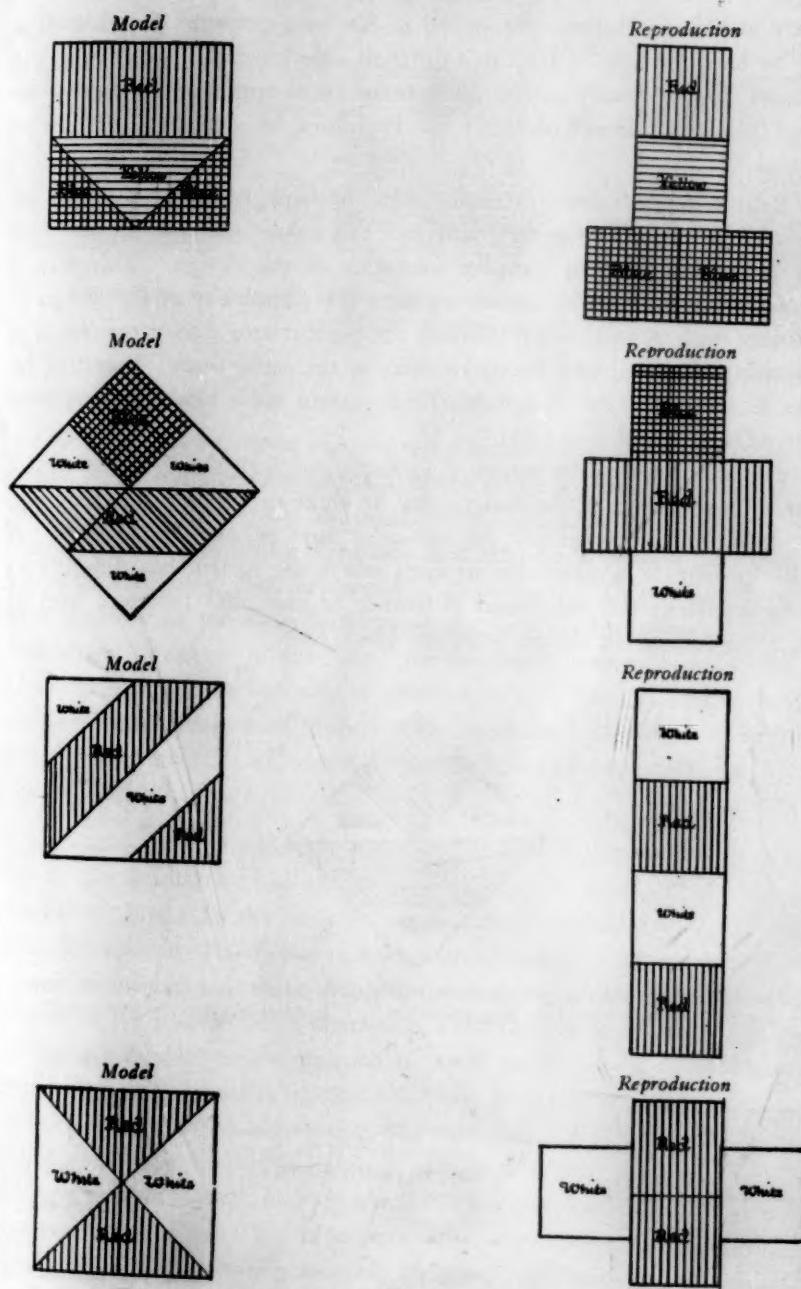
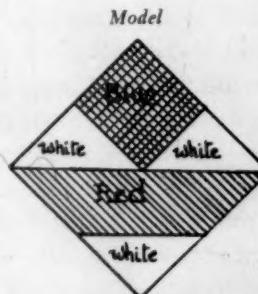


FIG. 8

which would cut through the model or his own pattern. In addition it may be hard for him to keep two different colors (of the two-color sides) in mind simultaneously and to differentiate them appropriately as the two colors on one single side demand it. Therefore, he avoids two-color sides (Figure 8).

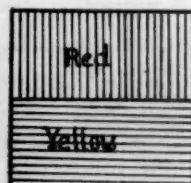
c. *Patient depends upon two-color sides;* he tends to use blocks with the two-color side up, because their half and half colors offer to him an easier way of reproducing the complex coloration of the design. This way is easier for him because he cannot organize the complexity of the design as a distinct percept, and cannot translate the percept into a color organization comprising one-color and two-color sides at the same time. Therefore he seeks to reproduce the design-matching pattern with blocks having two-color sides (Figures 9 and 10).

It also happens that the patient is so impressed with the *figure* or with a partial figural aspect of the design, that he seeks to find the corresponding pattern or partial aspect on the two-color side of *one block alone*. A similar procedure is observable in cases where the patient has difficulty in abstracting from the mentioned difference in size, and therefore tries in vain to reproduce the design with one block only.



The patient turns the blocks over and over, finally gives up and says: "Can't do it, there are no blue and white, must have blue and white." (The blocks have no two-color sides blue/white.)

Model

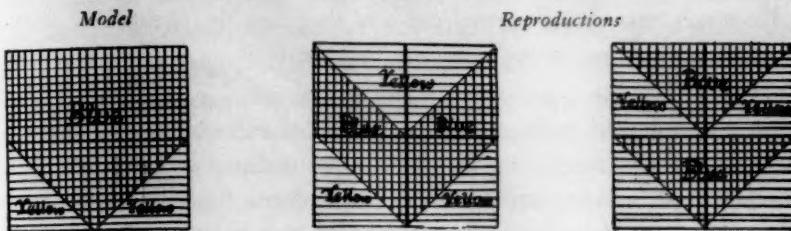


"Can't do it, need red and yellow sides." (The blocks have no two-color sides red/yellow.)

Reproduction



FIG. 9



Patient kept on turning the blocks, always seeking and selecting blue and yellow together on one block side.

FIG. 10

d. *Patient depends upon the concrete uniqueness of the single block-side.* While seeking the appropriate side of the block to match the design or a part of it, the patient may continually turn a block in his hand for inspection. He keeps on turning that block even after his inspection has exhausted all possible sides, so that he appears to perseverate. This apparent perseveration, however, has to be understood as a lack of the patient's capacity to realize and to survey in one "act" the number of colored sides which the block has; each turned-up side is something "new" to him and not one of the unalterable established properties of the block. The block, to him, has not a limited number of sides with a definite set of colors as it has for the normal subject.

4. *Patient depends upon the way in which he began to turn a selected block.* In seeking a block-side which matches the design or a part of it, the patient may turn the block in *one* direction and continue to do so even after all sides in this direction have been exhausted. Obviously, he is at this moment unable to shift the direction and to turn up the *other* sides of that block lying in the other direction. This is not sheer perseveration. The patient is subjected to the uniqueness of the turned-up aspects of the block and is incapable of realizing that the block has two more remaining sides which he did not *turn up* during this procedure. Actually he is not fully aware that he is following only one direction in his manipulation of the block; but to him "turning up block-sides of this block" is identical with turning up *all* sides. To differentiate the two required directions would presuppose that he has consciously in mind the principle of color distribution along six sides of the cube. This the patient cannot keep in mind

in the same sense as the normal can and therefore the thought of shifting the direction does not occur to him at that moment.

5. *Patient depends upon the bi-manual manipulation* of the blocks; subsequent inability to differentiate the manipulation with each hand separately. Certain patients display a definite tendency to use both hands simultaneously and to turn two blocks at a time. This procedure is also followed by certain normals in which case it is a time-saving device in organizing the block material. The normal subject holds in mind the various parts of the design he tries to copy, so that he can pay attention to two blocks at the time turning them with each hand for matching. The patient who also uses both hands may first impress the examiner as possessing that superiority of the normal. Very soon, however, the patient's odd behavior reveals that his apparent normalcy rests on entirely different psychological grounds. After having successfully completed a composition of two or three blocks, he proceeds to turn a third or fourth block seeking the matching side. While doing this with one hand, the other is not kept at rest but automatically turns one block of the correctly completed composition, following the same rhythm of the first hand. Thereby the patient destroys his own previous pattern. This may, of course, also occur in cases where the composition is objectively not correct, but subjectively experienced as correct on the part of the patient. Over and again one can observe in certain types of patients how this coöordinated manipulation with both hands builds up and destroys compositions without the patient's being able to control or to differentiate the movements of either hand according to the needs of the task in process. These movements are due to a dedifferentiation of the normal figure-ground contrast in performing and to the subsequent difficulty in separating the movement of one hand from the other.¹⁸

This fact manifests itself in the patient's inability to limit and to isolate special movements within a procedure which involves his entire person as a total action. To do this would require the ability to abstract from that total action and to differentiate figure and ground within it.

The foregoing behavioral analysis pursues two objectives: First, to give as complete as possible a survey of the concrete responses, because this has hitherto not been offered elsewhere. Second, though primarily intended for determining impairment of abstract attitude, this analysis may be used to differentiate between a concrete and abstract type of normals. Experiments with normals have shown that the more concrete type clings to a concrete

¹⁸ They are not necessarily "associated movements" in the sense of localized motor impairment.

procedure in the incipient phases of the test and shifts only if necessary to an abstract approach; the normal individual, belonging to the more abstract type, from the beginning shows a decisive preference for the systematic, analytic approach.

Our analysis has focused upon symptoms of pathological concreteness. We have tried to explain why failures occur and what they signify as to type of underlying concreteness. It should be stressed that not all of the enumerated symptoms are bound to occur in the same patient, and that one patient does not necessarily evince the same kind of symptoms consistently throughout the test. Indeed, not only do different patients manifest different kinds of concreteness, but the same patient may respond in different concrete ways to the various models. The failure responses here described should serve to familiarize the examiner with all possible deviations from the normal approach, because any one of them is a sufficient indicator of abnormality, provided that the subject cannot be induced to overcome his concreteness and to change his approach.

In order to validate this conclusion the authors have devised a number of crucial experiments. By means of these the examiner can ascertain beyond reasonable doubt that the subject is unable to overcome his concreteness, to change his procedure or to learn the abstract approach. We have designed certain graduated aids to facilitate the copying of the model. By virtue of these aids the normal subject can invariably solve the test because they assist him in acquiring insight into the demands of the task and in learning to apply them to other phases of the test.

DIRECTIONS

1. The patient is given the Ishihara test for color blindness in order to make sure that he can distinguish the colors of the design and blocks.
2. The patient is asked to name each color on the blocks. His mistakes, if any, are corrected as they occur (for instance the white side of the blocks might be called light yellow because the block colors wear out with use and certain patients are very meticulous).
3. Examiner says: "Here are four blocks. Each of the four blocks bears the same colors, you see (examiner takes a block in his hand and points with the other to the colored sides he names) this side is blue, this side is red, etc., this side is half blue, half yellow, etc. The other blocks have the same colors in the same order. I want you to copy with these four blocks the design you see on that card" (examiner points to the model).
4. The patient is presented with the designs and their modifications in

the sequence as they appear here. Each time the patient completes a step the examiner reshuffles the blocks.

Step 1: The original design. If the patient does not succeed:

Step 2: An enlargement of the same design which is the same size as the four blocks. If the patient does not succeed:

Step 3: The same design in original size, divided by lines which break up the figure into four squares corresponding to the four block-sides required for copying. If patient does not succeed:

Step 4: An enlargement of the same design (as under Step 2) again divided by lines. If patient does not succeed:

Step 5: A model of the same design built of four blocks. If patient does not succeed: The correct block model is presented again, but each block separately and an inch apart. If patient does not succeed:

Step 6 (multiple choice): Three models each built of four blocks, two models are faulty and one is an exact reproduction of the original design. Patient is asked to identify the correct block-model.

5. Whenever the patient succeeds on Steps 2-6, the examiner at once presents the *original* unmodified design again and records success or failure.

After completion of each step, whether correct or not, the examiner asks the patient: "Is that correct? Is that right?" (pointing to his product). The reply is to be written next to the recorded design made by the examiner.

6. Throughout the procedure a careful record is to be taken of all the comments, answers, and as far as possible of every move the patient makes with the blocks and of the stage the patient considers final or correct in his manipulation. It is advisable to use mimeographed record sheets in which the model is drawn on top and six sets of lined squares are provided for recording the patient's procedure. Examples of records: see Figure 11.¹⁹

As noted, each square in the record is numbered (1, 2, 3, 4) according to the sequence in which the blocks have been placed in that position.

7. The criterion of success or failure has to be derived from the following possible responses of the patient.

a. Success. The patient reproduces the design correctly and on inquiry acknowledges his solution as the correct one. Any uncertainty on his part outweighs his correct solution. In this case he has to be instructed to continue on the same design (if necessary along further steps), until he reaches a reproduction which he considers exact, be it correct or not. The latter, of course, has to be scored as failure.

b. Failure. The patient response is correct, but he persistently fails to

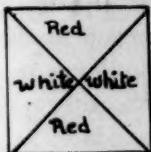
¹⁹ After Bolles.

Sample of Record-Sheet

Design No.

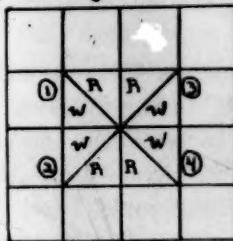
Date _____

Name _____

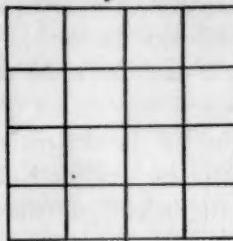


Reproductions

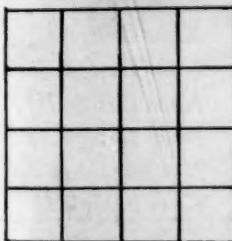
I Original



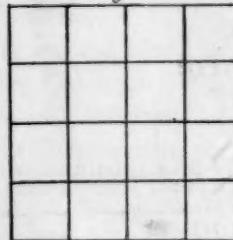
II Large unlined



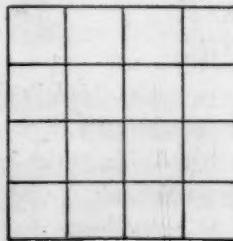
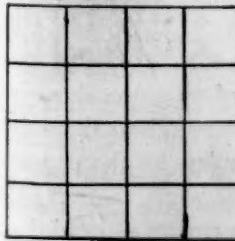
III Small lined



IV Large lined



Blocks



acknowledge it. The patient's response is incorrect, but he insists on its being the exact copy. The patient's response is incorrect, but in spite of his realizing this, he cannot improve on his product and gives up. The patient's response is incomplete—no matter whether correct or incorrect—and he gives up. The patient's response is either incorrect or incomplete, but he does not give up and continues, although futilely. If this goes on more than 3 minutes on the same step, it is scored as failure; this time limit may be exceeded according to the needs of the case (*e.g.*, motor handicap).

8. There are cases in which the line division does not help to improve the subject's response. In order to ascertain whether he sufficiently realized the line division, the examiner may use the following procedure: he may point out to the subject the lines on the model and demonstrate how they might be used to determine the placement of the corresponding block-sides. He may further explain or even demonstrate the way the blocks belong and then proceed with the test.

9. The designs used are based on those introduced by Kohs but not in the same sequence—nor are all of them identical. In the following, we numerate on the left the designs as we use them consecutively, and place the corresponding card of the Kohs material on the right. It should be further noted that in our procedure we do not utilize samples I and II of Kohs for demonstration purposes because no preliminary demonstration is given, but instead they are used as models too.

<i>Design I</i>	<i>Kohs Sample I</i>
<i>Design II</i>	<i>Kohs Design I</i>
<i>Design III</i>	<i>Kohs Design II</i>
<i>Design IV</i>	<i>Kohs Design III</i>
<i>Design V</i>	<i>Kohs Design VI</i>
<i>Design VI</i> blue square standing on angle	<i>Not present in Kohs</i>
<i>Design VII</i>	<i>Kohs Sample II</i>
<i>Design VIII</i>	<i>Kohs Design IV</i>
<i>Design IX</i>	<i>Kohs Design V</i>
<i>Design X</i>	<i>Kohs Design IX</i>
<i>Design XI</i>	<i>Kohs Design VIII</i>
<i>Design XII</i>	<i>Kohs Design VII</i>

A statistical analysis of Nadel's findings suggested to us the above given order of the designs because in this way the sequence follows the order of difficulty from that design which proved to be simplest for the patients to that which is most difficult.

There seems to be evidence that the Kohs arrangement of graded diffi-

culty of the 16 consecutive designs as it has been standardized for normal children does not hold for normal adults, nor for the groups of aments and dementes (8, p. 32; 56, p. 23).

Of the latter group some subjects can copy a design of greater difficulty on the standardized scale, but are unable to succeed on a design occurring earlier on that scale. Thus an easier design, as Card I  may be more difficult to such a subject because he cannot abstract from the size and works with one block or produces the design with the white surrounding, whereas card  suggests to him immediately the use of all four blocks, because of its marked subdivisions, etc.

EVALUATION

The patient cannot learn from aids

The instructions given above more or less incorporate two kinds of aids for the subject. In view of our foregoing behavioral analysis these aids need no special comment. *Enlargement* of the original model is related to the difficulty in abstracting from the discrepancy in size between the design area and the area covered by four blocks. The *lineal division* of the model into four squares is related to the difficulty in abstracting from the figure, *i.e.*, to break it up ideationally into four squares and to translate this division into four appropriate component block elements. One may safely assume that the modifications of the model in the order as prescribed for presentation imply a scale of descending difficulty. This is borne out by the results of experiments with various groups of subjects.

In the course of our investigations Bolles and Nadel carried out two sets of experiments under the supervision of Goldstein and applied the modifications introduced by him. Goldstein and Scheerer in testing more than 50 patients suffering from cortical disturbances used the modifications as listed in the directions; the hitherto unpublished findings are included in the evaluation presented here.

Bolles (8, 9) worked with nine hebephrenics of dementia praecox type, and ten mental defectives (aments)—both groups adult—and with ten normal children (8-9 years old). She used five of the Goldstein modifications—the standard design, then the enlarged design, then the design in original size divided by lines. The next step was a demonstration of how the lines might be used to determine the placement of the blocks. The final step consisted in presenting the subject with the model built of blocks.

Nadel (56) used fifteen patients with damage to the left frontal or both frontal lobes and a control group of fifteen other patients with no clinical manifestations of mental deterioration. He used five of the Goldstein

modifications consisting of the standard design, the large unlined design, the large lined design, the block model and a multiple choice of four block models including the subject's own incorrect response. As can be seen from the following table each series of modifications applied by both experimenters contain, in principle, the same crucial stages as used in our own studies and given in the directions above.

	<i>Goldstein-Scheerer</i>	<i>Nadel</i>	<i>Bolles</i>
Step 1	standard design	standard design	standard design
Step 2	enlarged unlined	enlarged unlined	enlarged unlined
Step 3	lined standard	lined enlarged	lined standard
Step 4	lined enlarged	demonstration (lined standard)
Step 5	block model	block model	block model
Step 6	multiple choice	multiple choice

Evidently the findings in these and our own experiments are comparable as to the sequence of modifications administered. The differences between our use of a lined enlarged and that of a lined not-enlarged design in the demonstration preceding the block model stage by Bolles, etc., do not affect the common crucial principle of the sequence; as a matter of fact the sequence in our directions grew out of an analysis of all the findings mentioned. We have found that this arrangement covers all modifications which are at all possible and which are the best suitable, graded aids for a variety of mentally impaired subjects. This sequence corresponds to the experimental results common to all three investigations.

1. The modifications presented can be considered a graded series of steps decreasing in difficulty or increasing in simplicity. Notwithstanding the slight variations as indicated in the table, the sequence in each experimental series contains as crucial steps the standard design, thereafter the enlarged unlined, then the lined design (either enlarged or not) and the block model proper. The simplification consists of stages of diminished discrepancy between the original design to be copied and the unit to be composed by the blocks. Although we are entitled to speak of these presentations as descending stages of difficulty, these stages do not necessarily represent equivalent steps of simplification.

2. In most cases wherein an abnormal subject failed one of the easier steps, *i.e.*, one of the later presentations, he could not succeed on the difficult steps, that is, one of the earlier presentations of the same design.

The abnormal subject, even in the case of previous failure, succeeded on the block model or multiple choice with but rare exceptions.

3. The difference between the performances of normal adults and of abnormal subjects on the test is that on ten designs only few instances occurred where the normal needed a simplified presentation for his solution.²⁰

4. The modifications introduced represent aids of a concrete, palpable nature; they supplant in the phenomenal realm of perception the lack of abstract approach which the subject does not or cannot assume at that moment. It would be absolutely erroneous to suppose that these aids help to initiate a process of abstraction in an individual who lacks the prerequisites for that act. These aids simply render that act unnecessary.

This is borne out by two crucial facts: the abnormal subject who has failed on the standard design may succeed on any one of its simplifications. But if presented thereafter anew with the same standard design, he will again fail. This graded procedure can be repeated with the same result and actually repeats itself under the various designs. This signifies that the subject has not profited by the aids, that he cannot do without them. In short, he cannot learn.

In contradistinction, the normal subject is able to benefit from the aids. He can learn. For even in the case that he needed help, he later can do without it. Should he have failed on the standard design, he invariably will succeed on any one of its simplifications and also on the same standard design if presented again. Moreover, the normal individual profits by the aids in that he will have less difficulty in solving the designs that *follow*. In other words, he is able to learn—even in the case that an easier step should be required for succeeding on the standard design—and to apply what he has learned to other designs. (This is evidenced by an obvious shift in his manipulative approach.) The reason is, that to the normal the aids signify something different than to the patient. For the patient they are concrete presentations, approaching more and more the phenomenal qualities of the blocks he has to deal with (either by conforming in size or by breaking down to squares). In some cases of stronger deterioration the aids may function as immediate visual cues for bridging the gap between the design and the blocks without the patient's realizing the mentioned approximation, but simply being passively guided by the cues in his

²⁰ Nadel found only ten instances among 150 reproductions of normals where aids were necessary and this occurred twice on card V; once on card VIII; and 7 times on card X of the Kohs standard series. Card X is the most difficult of the entire group, especially because it involves a shift to nine blocks instead of the previously required four blocks.

manipulation. When the patient can only perform on that block model, where the blocks do not touch each other, but are separated, it is obvious that he does not copy a design at all, but simply matches each separately given block with one of his own. Actually this no longer has to do with the task of reproducing a *design* even though made up of blocks, but is a reproducing of four single blocks—each for itself. The patient reproduces one block at the time four times; this may be due to his complete incapacity to break down the design or the given block *model* into given parts (dependence upon figure) so that he can only reproduce *singly* given blocks; or it is owing to the fact that he has no distinct appreciation of the figure ground relation of the design. From all this we gather that the patient, if deprived of the concretely experienced aids or cues, cannot operate without them in the abstract.

The normal, however, experiences these concrete aids not simply as perceptual approximation to the block material. Because he always has the potentiality for the abstract attitude, he grasps at once the principle underlying the visual cues. Or, to put it differently, he abstracts a general rule from the given simplification in lines or in size. Because of this process of generalizing insight, he does not fail any more after the simplified step and is able to apply what he has learned. For the same reason, working in the opposite way, the abnormal subject cannot learn, because he could not generalize.

This throws light on another finding—those subjects that were able to perform under the standard presentation were always successful on any simplification of this design.

We may summarize our conclusions as follows: There is definite indication of impairment of abstract behavior if a subject cannot profit by the facilitating modification, so that he fails again on the standard design. From our experiences with the various groups of mental defectives, we submit that whether or not a patient ever learns is a reasonable measure of the degree of disturbance. Any learning that occurs is a symptom of a lesser degree of deterioration. There is definite evidence that patients who improve in their mental status (*e.g.*, after hemorrhages or operated brain tumors) also show improvement in their performance on the test. Therefore, retesting at certain intervals is feasible for checking up on possible recovery or progressive impairment. Just because it appears definitely established that patients with impairment of abstract behavior are incapable of learning, or of acquiring the abstract attitude by learning, this test may

be repeatedly administered without any risk of training effects, which otherwise might conceal an existing defect.

The authors could not as yet evolve experimentally verifiable criteria for different levels of abstract and concrete behavior. However, the experimental findings in this test suggest that there are *degrees* of lesser and stronger concreteness in a subject, which correspondingly require more or less concrete aids. A subject who needs only facilitation with regard to the difference in size is in all probability less concrete than a subject who fails with this help and requires the line division. Likewise a subject is still more concrete if he can perform only on the block models, etc. In turn these degrees may offer a measure of the degree of deterioration.

The test therefore should be suitable for studying impairment of abstract behavior in cases of mental deficiency due to abnormal development, brain lesions, dementia praecox.

THE GELB-GOLDSTEIN COLOR SORTING TEST²¹

Description of Test. The purpose of this test is to determine whether or not the subject is able to sort a variety of given colors according to definite color concepts (for example, category of red, blue, etc.). Sorting according to the category of a color means the inclusion of different shades of a color, for instance different greens, in one class.

At the same time it means psychologically that one has to disregard or to abstract from the given individual shades, and to be oriented as to the common element of the various presented shades; e.g., one selects all reds without regard to the differences in intensity, purity, brightness, etc., of the single shades, or one sorts various colors from the point of view of the same brightness, same intensity, etc. Furthermore, this test shall provide evidence of the approach and procedure by which the subject evolves a basis of pertinence.

1. Woolen skeins of different hue and tint²² are placed at random before the subject in a heap. Of each color hue at least 12 different shades are present. The examiner asks the subject to select a skein he likes and to pick out all the skeins which he believes can be grouped together with the chosen one. If the number of skeins so selected is smaller than the number of skeins bearing that hue in the heap, then the examiner picks up all the remaining skeins of that hue and asks whether these might not be included. This procedure is repeated with other colors.

2. Three skeins are placed before the subject, the left and center skeins are of the same hue, but different in brightness and saturation; the right skein is the equivalent to the center skein in brightness but different in hue; e.g., dark red, pink, light green. The skeins are chosen so that a choice of two skeins can be made, either according to hue or according to brightness equivalence, unless these relations are completely rejected. In presenting four sets of this kind the position of the right and left skeins is alternated. The examiner, pointing to the middle skein, asks the subject with which of the other two it belongs.

3. The subject is presented with two rows of skeins, each containing six samples. One row is a series of a scale of red from lightest to darkest. The second row is made up of different hues but of equivalent brightness:

²¹ Based on the publications of Gelb, A., and Goldstein, K. (18), and the subsequent investigations by Goldstein, Scheerer, Bolles, and Nadel.

²² The authors first used the set of woolen skeins which Holmgren introduced for testing color efficiency.

red, blue, green, yellow, brown and purple. The subject is asked to select that group the members of which he thinks belong together better.

4. The subject is asked to select all reds or all greens. In each of the four experiments the subject is asked to state his reasons for his grouping or for his answers.

BEHAVIORAL ANALYSIS

The Two Approaches. According to the analysis of Gelb and Goldstein there are two general approaches in dealing with these tasks, an abstract and a concrete one.²³ In the abstract approach we deliberately treat the skeins not as "given things," but as *representatives* of their basic color hue. We detach ourselves by conscious volition from the unique impression of each skein and generalize our sorting. Though we realize the specific attributes of the individual skeins, such as intensity, brightness, softness, warmth, purity, we ignore these differences. For we can abstract and hold fast the generalizing procedure once initiated. Because of this, we are also able to account for what we do, and to formulate the conceptual principle of our sorting. We will name the color category according to which we sort and also accept a number of different shades of the same basic hue as belonging to a common color category.

In the concrete approach the subject is given over to an unreflective apprehension of the color impressions. For instance, when we hold a sample and pass it over the heap, passively surrendering ourselves to the impressions which may arise, then one of two things will take place: If a skein resembles the sample in all attributes, all these immediately cohere in a unitary sense experience with that sample. If, however, the skeins present in the heap do not match our sample in all respects, but only in some, then we shall experience the following: changing congruencies between the sample and certain skeins; once a cohesion of brightness qualities comes to the fore, once a cohesion of colors or of intensities or of softness; and immediately following one of warmth or pleasantness and unpleasantness may arise. Each of these aspects is so unstable and emerges so rapidly that we see the heap as fluctuating and at the same time experience a rivalry between the constantly moving congruencies. This experience of rivalry and fluctuation is due to the fact that we are delivered to the varying impressions of a sensory belonging-together. As our eyes pass over the heap, this belongingness thrusts itself upon us, as arising from the similarities between skeins and the sample in our hand.

²³ L.C., subsequent investigations by Weigl, Eva Rothmann, Bolles, Nadel, Scheerer in collaboration with Goldstein brought out the same distinction [(70), (61), (8), (9), (10), (20), (56).]

Within the confines of this concrete experience true sorting cannot be effectuated. Nothing fits, until it is experienced as identical. And this identity is one of an "all or none character" of the total impression. Therefore, in the concrete approach we actually do not sort, but perform a matching procedure. This matching procedure has a certain range, depending upon the degree of concreteness. The strongest concreteness can be considered matching for identity; *i.e.*, the subject depends upon his experience of "uniqueness" of the sample and is looking solely for the same "thing"; therefore he can match only within slight deviations from the original sample. A lesser degree of concreteness is present when the subject is bound to a particular shade of the sample and does not deal with it strictly as a thing, but as a color. Therefore he is able to experience various aspects of color cohesion between the sample and certain skeins, and has a greater number of impressions in which sensory belongingness can occur. This allows for a wider range in his matching so that his "sorting" includes also skeins similar to the given one. Hence, in both cases the sorting is restricted to a number *smaller* than that of the skeins present in the heap, belonging objectively to the category of the sample's color here.

In the first type of concreteness the number of skeins selected will be very low, in the second type—naturally higher. Compliance with the sorting tasks (1) and (4) of the test, definitely requires an abstract approach, a categorical attitude. The normal individual may begin with a concrete approach, but, since he has the abstract capacity and with that the ability to shift, he can at will or upon request assume the abstract approach.²⁴ This is borne out by the fact that in the case where normals have selected a small number of skeins, because of a more concrete approach, they will accept or include additional skeins of the same hue, if it is suggested by the examiner. Their comment in such instances is frequently: "I did not select those because I thought you did not want them included. They do belong there, they too are reds, greens, etc."

Abnormal individuals with functional disturbance of the brain cortex are incapable of assuming the abstract approach. This lack frequently expresses itself in the restricted number of spontaneous choices, and the refusal to include more skeins, if presented with them. However, not all cases are as clear cut and the defect expresses itself in a different behavior symptomatology where a greater number of skeins is matched to the sample. Therefore, a qualitative analysis of the subject's procedure is mandatory in each

²⁴ Recent investigations have shown that normal and deaf children (age from 5 to 17) are able to sort colors categorically (4).

case. Without minute observation recording every phase of the subject's procedure and without special control experiments, it is impossible to ascertain the presence or absence of the categorical attitude. In the following we attempt to develop some criteria which are crucial for abnormal concreteness in this test.

CRITERIA OF ABNORMAL CONCRETENESS

1. Matching instead of sorting. Dependence upon uniqueness of the sample.

a. Restricted matching. Let us describe a typical case: S. holds the sample in his hands and either passes it over the heap or looks searchingly back and forth from the sample to the heap. Slowly he picks up some few skeins, one after the other, and carefully compares each skein with the sample. At times he may put down the sample, after having made his first selection. Now he uses the last chosen skein for a sample, repeating the foregoing procedure with exactitude.

This extreme dependence upon the sample expresses itself further in hesitancy, meticulousness and abnormally slow performance. Throughout the procedure the subject does not drop each chosen skein casually in a separate heap as normals do, but scrupulously places the skeins one beside the other. The subject's entire behavior gives the general impression that he is unsure and finds the test difficult to a point which is incommensurate with the task imposed. The uncertainty is evidenced also by his rejecting certain skeins which he first picked up and later reconsidering them again, and by his frequent questioning. The number of skeins he eventually includes may vary from one to four, all as close as possible in hue and tint to the sample. (In the Holmgren wools there are almost no identical skeins.) A patient, for example, when asked to select all the skeins belonging with a particular red sample, chooses one skein which resembles the sample very closely. He then picks up another skein of red, holds it over the sample, and then rejects it. When asked why he did not include it, he says: "It is dark pink." He states that there were no other skeins that belonged with the sample. When the examiner selects all the various shades of red and asks whether they belong together, or in what way they are alike, the patient states that they weren't alike but that they were all different.

Another patient selects three very similar red skeins to go with the sample. The examiner picks all skeins of reddish hue and asks whether they do not all belong together. The patient (pointing to one of his choices and to two of the presented skeins) says: "These may be, but they are another shade,

they are vermillion." These examples of restricted matching could be multiplied.

If we analyze the subject's behavior with regard to concreteness, we can point out the following factors: the dependence upon the sample is an expression of lacking a general frame of reference. Because of this, the subject is either delivered to the uniqueness of the sample-as-a-*thing*, or, in a less rigid sense, as a singular color-shade. In the first instance the restriction is stronger than in the second, where the subject is delivered to a variety of sensory cohesions as described above.

The characteristic hesitancy and exactitude, etc., are thus either related to the subject's tendency to search for the identical thing, or to experience of "rivalry" among various colors in the heap as they cohere sensorially with the sample. The fact that the subject places the skeins meticulously one beside the other and not as the normal, in a heap, is significant. The normal treats the single skeins casually because he deals with them from a generalized point of view. To his collective, categorical approach, his variously selected skeins belong in one class; and placement and individual nuance is totally irrelevant. In contradistinction, the *abnormal* is bound to the single skein and cannot treat it in a fashion, where placement would be arbitrary. He compares each chosen skein with the sample. While he keeps this in his hand, he minutely places each selected skein on the table. At first he matches only the almost identical skeins, then, after these are no longer available, he may hesitantly match some few that resemble the sample a little less. Hence he selects one single skein at the time and deposits it beside the last one as a separate accomplished result. Thereby a spatial arrangement may be formed which appears as a row of several skeins belonging to the same hue. But the subsequent query or the accompanying comments of the patient reveal that he actually did not intend to form such a row. He was not even aware of doing this because he actually treated each skein separately as something "new." In other words, he does not form a row of colors from the point of view of the same color category, but he executes individual matching performances. For this reason he could not throw all matched candidates in a random heap, as belonging together; what appears to be a row was nothing but the sequence of individual matchings with the sample; and this can reflect itself spatially in a row of skeins placed in succession. From all this it should be evident that the patients do not actually carry out the task of "sorting," but perform individual matchings between the sample and single skeins, one after the other.

An assessment of the defect's severity, as measured by a matching pro-

cedure according to identity (sample as "thing") and a matching procedure according to similarity (individual color), has not as yet been supported by statistical data. The findings up to date, however, point very suggestively to such a differential measure. In any event, if concreteness expresses itself in a restricted selection and refusal to include more skeins of the same hue, the criterion of uniqueness of the sample is numerically indicated.

b. Matching in a pseudo series. The dependence upon uniqueness does not necessarily always manifest itself in the low number of choices *per se*. There are cases in which the proposed criterion seems to be invalid, because of the greater number of skeins picked out. A subject, who behaves in most aspects as described under "a," may produce a grouping which includes quite a large number, if not a complete array of skeins belonging to the basic color hue of the sample or to the color-name according to which he was instructed to sort. In this case the subject picks many skeins of the same hue in a definite order of shading so that the skeins put down in succession appear to make up a brightness series. A row of skeins is formed either of ascending or descending brightness. The experimenter easily may have the impression that in his grouping the subject has classified all of the shades pertinent to the same color-hue under one concept, and that very neatly—because the subject has even arranged the skeins in a brightness series. Closer scrutiny, however, discloses that the subject had no such categorical point of view in mind, nor did he intend to form a series according to brightness, or to form a row. Minute observation of his actual procedure reveals: The subject selects skein A by matching it with the original sample. Now he deposits the sample on the table, keeps the new skein A, and matches to this one the next skein B (piece to piece comparison). Then he deposits skein A, keeps B and continues in the same way. Thereby the last chosen skein always becomes the new sample. After it has served its purpose as a sample, it is placed on the table and the new skein now serves as a sample. Accurately speaking, one should not use the term "sample" because it suggests a representational meaning, as if in the subject's view the sample "stands" for something, e.g., for the general color. In this connection the usage of the term "sample" should be solely understood in the sense of a "matching mate," i.e., that to which something else is fitted on the basis of like sense impression. Since the skeins of equal hue are present in the heap in varying shades of brightness (approximately 12), the subject will naturally match first the most similar shades. He begins with the almost identical skeins. After they have been deposited and there are no more available in the heap, he matches to this new sample

the most similar one and so forth. Hence in the objective effect he keeps on adding less and less similar skeins, as compared with the original sample which he deposited first. By this procedure it easily happens that the skeins that are put in a row form a pseudo series of ascending or descending brightness. In reality the subject forms no brightness series, but actually performs a number of separate matchings, each being a complete performance in itself. This is borne out by the fact that, after each matching, the subject deposits on the table the skein he holds in his hands together with the newly matched one and forms a pair, keeping these two spatially together and separated from the rest. Then he picks up the last skein and, using it as a new "sample," repeats the procedure; thus each pair is broken up when the new skein is picked up. Thereby a row is formed of constantly changing, successive pairs: each matching unit is spatially accentuated by the described separation, the space-interval, between the two last deposited skeins and the preceding ones. As explained, the reason is that the subject uses each newly selected skein as a "sample" for his next matching, according to sensory cohesion between it and the most closely fitting member of the heap. This action unit of matching expresses itself in the spatial arrangement described.

There may occur variations of this procedure in the same or in different patients; for instance, the subject does not deposit both skeins together but only the original sample: he keeps the new skein as sample for his next matching and repeats that procedure; or he deposits the original sample on the table from the very start and then brings the candidates for matching to the sample on the table; he matches one skein to it and then the next skein to the last selected and so forth; or the patient may even keep the original sample and first match the almost identical ones, then adding less and less similar shades. By that he actually does not match them to the sample but always to the last skein selected. In any of these variations the fact remains that, with or without the described pairing and space-intervals, the skeins appear in the spatial order of a row and as a pseudo-series, although the patient did not intend to form a row or a series of brightness. This fact of unintended pseudo-series can be ascertained by various means. One may ask the subject whether all of the shades he selected belong together, a fact which he will usually deny by calling them by individual color names like maroon, pink, vermillion. One may inquire whether he intended to form a series; one may ask him—after restoring the heap—to arrange the color shades in a series of brightness. This he is unable to do, because he has not the *concept* of the basic color, let alone the ability to

form the generalization of brightness in an ascending or descending order, neither can he form the idea of series. One may present the subject with an order of brightness and ask him whether this arrangement makes sense to him and probe his ability to verbalize the principle of the brightness series. Finally one may avoid any interposed verbalization on either side by making the following control experiments:

The Experimenter takes each time the last chosen skein away and conceals this from the subject's view; or he removes this one as well as the skeins already matched. Then the subject usually is lost. He is either unable to continue at all, or begins to pick out entirely different hues. In this connection it should be mentioned that the described type of individual matching may lead to kinds of series other than those of brightness. For example the subject may have matched not in pairs but in fours of almost identical shade, etc. A striking illustration of that uncategorical procedure is the following: Subject has begun to match the greens and in his pseudo-series hits upon a strongly yellowish green. Now he does not continue with green but, geared by the sensory impression of yellow, matches the next similar yellow to the last yellowish green skein on the basis of sensory cohesion. This sliding into what the normal would call a different color hue is for the subject not at all an experience of such change. In order to have that experience, he would have to possess the concept of the color, according to which he was matching. His procedure again confirms our description of individual matchings. It also contradicts the hypothesis that the subject, who behaves in that way or who cannot proceed after removal of his selection from his view, has this difficulty because of a memory defect. In the above example the skeins have not been removed and this did not prevent the subject from picking up different hues. By now it should be clear that only minute observation can avert erroneous conclusions since one may be easily deceived by pseudo-series.

Before summarizing, let us peruse some protocols: Six patients placed the skeins in a tint series. Having chosen one skein, they would then select the one nearest to it. By the process of trial and rejection further skeins were chosen by holding the last selected skein over the heap. The final product was a result of bringing together pairs of skeins that gave essentially the same sensory experience. This type of procedure is shown clearly by one patient who held a sample in his hand, passed it over the large heap of colors until he found one like the sample and then selected another similar to the sample by the same method. He said that he proceeded in

this way because he did not believe he could do it unless he held the sample in his hand, since he had to compare them.

When urged again to select all that belong with the skeins already chosen, the patient held one of the skeins of the heap of colors and finally selected a skein that was closely similar in shape but slightly lighter. He then placed the first skein on the table and held the second skein over the heap, selecting a skein that resembled this one closely. By this method the patient selected five more skeins of lighter and lighter tint. When asked if they all belonged together, the patient denied it. To the question, "Couldn't they all be called red?" he responded, "No, these two are red, this one is pink, this one is maroon." The patient was then asked to select all the reds, but this time the skeins were immediately concealed as soon as selected. The patient then said, "Without comparison? I think I would have to compare, I would have to hold one in my hand and look for the others!" This patient was unable to repeat under this new procedure the series made previously.

The foregoing analysis goes to show that the dependence upon uniqueness of the sample can express itself in one of two ways:

I. In very restricted matching.

II. In repeated matching of a greater number of skeins. In this case accurate observation and inquiry are necessary in order to avoid erroneous inferences from the *apparently* greater number of choices.

III. In addition, after the pseudo-series had been formed, the patients do not accept the suggestion that the shades all belong together or that they can *all* be called by one name, *e.g.*, red, green, etc.

2. *Dependence upon uniqueness of individual color shades.*

a. Expressed in individual color naming. Sometimes patients assemble a fairly great variety of skeins of same hue without actually having the categorical attitude and without proceeding by single matchings in a pseudo-series. In these cases the patient will respond to the instruction "Put all greens together" in selecting one green shade after another, but he names each differently. Each nuance that he picks up he calls by a separate name, but refuses to call all nuances by one *common* color name (18, p. 133); for example, "when asked to put all the greens together, the patient picked up one green sample and said, 'I've seen grass this color.' He then selected other shades of green, saying 'This is the color of the grass in Virginia, this is the color of the grass in Kentucky,' etc. He then placed a brown skein with a green skein and said, 'This is the color of the bark of the tree and this is the color of the leaves.' The selection of skeins by this patient

was made with great care and meticulousness and he paid close attention to each skein examined" (9, p. 9).

There are cases in which a patient behaves in a similar fashion but apparently agrees, if asked whether the shades do all belong to the same color. However, he is not capable of accounting for that acceptance and relapses into an enumeration of the names of the individual shades. "When asked to select all the green skeins, the patient picked up skeins in an apparently random order of brightness and saturation. As he picked up each one, he gave it a specific color name: 'Peacock green, bell green, baby green.' To the question 'Could they not all be called green?' he agreed" (9, p. 19). When asked in what way they were alike, he repeated this color naming.

One of our patients, who brought together the skeins of different brightness, proceeded in the following way. Each sample had a specific color name. In selecting them he names them: "Peacock green, emerald green, taupe green, bright green, egret green, bell green, baby green." Each color had a particular name for him. He stated that they were not all green but "different shades." Patients who behave in this fashion and are urged by the examiner "whether they all could not be called by one name?" often reply, "Yes—a variety of colors," or "a mixture of colors" or even "a mixture of greens," etc.; but they refuse to accept one name for all the red or all the green skeins respectively.

A patient, when asked whether the pink skein might also be included in his red choices, immediately *agreed*. However, to the question, in what way were they *alike*, or why they belonged together, the patient answered: "Oh, they are not alike. These are red" (putting three bright red skeins together). "And these are pink" (placing the remaining skeins together). The patient may answer positively the question of whether other skeins may be included, too, because this statement carries with it the implication of such a possibility, and thereby constitutes a leading question. As long as the patient cannot account for his acceptance in a verbalized generalization, we cannot credit him with a true abstraction. Pertinent to the problem is a patient's behavior after having failed in repeated tests. One day she sorted and called the different shades of red by the same name. The amazed examiner asked why she now called the different shades by the same word. Answer: "The doctors have told me that all these colors are named red. Therefore I call them all red." Asked if this was correct, she laughed and said, "Not one of these colors is red, but I am told to call them by this word" (Case W.). This phenomenon of yielding to the

examiner's query can easily be clarified either by further penetrating questions, or by control experiments.

b. Dependence upon uniqueness of individual color shade expressed in seemingly general names. Another phenomenon which has been frequently overlooked in this kind of testing is that a subject may use generic color names but without conceptual meaning. According to the instruction, the subject has to select a particular color he likes, or to pick out a "green," "red," etc. Now every subject whether normal or abnormal will select a special shade of red or green, etc., which to him fits best that name and denotes a specific color name. This nuance chosen differs among the various subjects. In one case it may be a more dark, in another case a more bright green, etc. For the normal person his preferred nuance will be a *typical representative* of that basic hue, symbolic of all he selects (when, for instance, told to choose a green). For the patient, however, his chosen nuance is not a representative of a class but one individual color tone to which that name belongs exclusively. Thus if he applies a general color name to a specific shade, or responds to this name by choosing *one* correct shade, this does not mean the same as it does for the normal and therefore may deceive the examiner. Very elucidating in this regard is a protocol of Weigl (70, pp. 7, 8).

"Patient Rat. was instructed to pick out from a pile of Holmgren wool skeins those which were similar to or went with, a particular sample. The patient slowly tries out various skeins by holding the given sample next to each one. In most cases, however, he rejects the skeins thus singled out and finally decides upon very few—namely, the practically identical ones.²⁵

The experimenter now takes a series of different greens out of the heap, puts them together in a bunch and asks the patient "whether these don't all belong or fit together." The patient denies this emphatically and says, pointing to one dark skein in the bunch, "Green!" Then he indicates by gestures that the other skeins have nothing to do with this one and that the experimenter should lay them aside. Suddenly, however, he catches sight of a poison green skein in the bunch (which had evidently been concealed from him previously by the other lying on top of it), and now he endeavors vehemently to make clear to the experimenter that he had made a mistake before, that the first mentioned dark green skein was not green at all; only this one (the poison green) was green. At the same time he searches with great effort for a new designation for the dark green skein. The patient indignantly rejects the suggestion of the experimenter, that one

²⁵ The color sense of this patient was ascertained to be entirely normal by examination with the Nagel anomaloscope.

might say of this skein too that it is green, that perhaps all the skeins in the bunch are green. The patient continues in his endeavors to find a special name for the dark green skein. This patient, too, is not really contented with his choice until he has found the completely identical colors. Similarly he is quite at a loss when confronted with the idea of applying a principle of classification (for example, the category "green"). He does not understand at all what is meant by the statement, "They are all green." The word "green" suits him only when applied to a certain quite definite shade (the poison green). The "mistake," which he believes he has made, is very characteristic of his present mentality. In spite of the fact that he was able to apply the word "green" to both skeins, he performed in a way which was quite different from that of a normal person. Since for him this word is evidently suitable only for one *definitely unique* color experience, he is, to be sure, capable of designating akin sensory impressions by the same term, but only as long as the "true" shade is not present. As soon as he has found *his* nuance, the one first designated can no longer be conceived as being green. The procedure of this patient is "uncategorical" in the highest degree. For him designations fit only to a very *limited* type of sense-impression, and he remains unsatisfied if he cannot call each nuance of color-tone with a particular name." The phenomenon of using a *seemingly general* name can lead to a number of misinterpretations by the examiner. Such fallacies can be caused by another peculiarity of patients in cases where they strive to overcome their lack of categorical attitude. Amnesic aphasic patients may disguise their concreteness by circumlocutions. When the patient, for example, fails to find the color name he seeks, he uses a periphrase which may contain that name without its categorical implication. In that sense an amnesic patient may find the color name by uttering a routine phrase, which evokes the image of an object, to which belongs the color he tries to name. He recites phrases or word patterns such as "blood red, strawberry red," or "blue like forget-me-not"; or "blue blooms the flowerlet, it's called forget-me-not" (beginning of a German poem); "sky-blue, tree-green, green like a frog, snow white," etc. It is self-explanatory that these words are either rote memory possessions or connected with individual thing-like experiences. After he utters the phrase, he may name the color correctly. Yet a short while later he again is unable to find the color name. This fact is strikingly illustrated by protocols of Gelb and Goldstein (18, p. 170): The patient is first asked to point out in the heap the color that is named by the examiner (red, blue, yellow, green). The patient fails completely although he correctly repeats

What is this?

each time the name of the color; he points to entirely wrong colors, in spite of his normal color efficiency. If, however, he is asked to point out the colors pertinent to a *named object*, he succeeds promptly. The patient is asked to pick out a color looking:

"Like blood": Patient takes hold of a red in the heap, it does not suit him, he searches further, and returns to the same.

"Like a leaf" (of a tree): Patient digs among the samples, looks at the correct ones, rejects them and says: "This one" and picks an olive-moss color.

"Like a lemon": Glances at a light yellow, does not pick it, then takes a color somewhat darker, which does not match as well.

"Like the sky": Patient first points to Prussian blue, hesitates, picks up several shades of blue, but feels himself not at all sure.

"Like a letter box": Patient points promptly to royal blue (royal blue in Germany).

"Like a billiard table": Patient points promptly to light olive green.

"Like a corn flower": Patient picks a light blue, after long hesitation, decides for royal blue.

"Like forget-me-not": Patient picks the correct color promptly.

"Like a cherry": Patient picks a yellowish-brown-rose color, says: "No," points to dark red, but is not entirely satisfied (correct nuance is missing).

"Like a tree-frog": Patient says: "There are many," he picks a mignonette green and stands by his choice.

"Like a strawberry": Patient acts in the same manner as by "cherry."

Thus in these patients color identification is dependent upon concrete reality which is either actually present, or verbally or imaginatively present. This concreteness is the factor responsible for the circumlocutions, which may contain the general color name without its general meaning. This phenomenon is the expression of a general rule which may be formulated as follows: If the patient is brought into a situation which enhances the realness or widens the reality-scope of a task, he can perform more easily. Therefore, we find among individuals, who do not suffer from amnesic aphasia but from other cerebral pathology, the following analogous characteristics: In most cases the patients will select a greater number of skeins in task 4—where the color name is introduced in the instruction, than in task 1, where sorting in connection with the sample alone is demanded.²⁶ Probably the sample exercises an influence towards a shrinkage of reality, whereas the verbal instruction leads the patient into a situation of wider and

²⁶ This statement is borne out by table 6 and the statistical results, page 47 in (56).

less rigid scope. This difference obtains in a similar way to normals in their sorting of members of primary hue (but they can accept skeins of the same hues, if added by the examiner).

3. Dependence upon a specific situation.

Sometimes patients amaze the examiner by bringing together colors where the basis of pertinence is not apparent to him. Skeins of entirely different hue, not fitting the sample, are selected.²⁷ Inquiry reveals that the patient did not sort according to any of the aforementioned types of concreteness (uniqueness, or sensory cohesion, etc.). The patient of Rothmann (61, p. 16), for instance, placed as belonging to a bright green sample a dark blue and white skein; to a bright yellow sample a dark brown and dark yellow skein. "The patient proceeds very carefully and weighing the color values, she places one color alongside the other, rejects one or two, selects a new one at another time, until she finally seems content." Asked "Why just these colors?" she answers: "This is a jumper and a skirt, this is a shirt front." In other phases of the test she rejects colors on such grounds: "But they are not summer colors." Hence the patient was far from grouping colors arbitrarily, as it appeared, but had very definite concrete esthetic "associations." More accurately stated, she sorted colors as they belonged for her in a specific situation, and was unwilling to accept categorical appurtenances. Another, a male patient (9, p. 8), when asked to select all the red skeins and place them together, chose three skeins of a bright, well-saturated red and then stopped as if the task were completed. Questioned if these were the only red ones, the patient said: "Yes." A lighter red was then presented by the examiner with the question as to whether it could not also be included. Answer: "Yes, if you were knitting and needed another color." In tasks 2 ("to which does the center skein belong?") and 3 ("which row belongs together better?") such responses on a concrete, situational basis are especially likely to occur. For example, "This is a good combination for sweater and skirt, this is a better combination for knitting, these look nicer, etc." It should be noted that in all cases where a normal individual first responded to the two rows in task 3 in a concrete manner, he could easily be induced to shift towards abstract evaluation in terms of hue or brightness.

4. Dependence upon sensory elements such as lightness and darkness.

In task 2²⁸ the arrangement of the three skeins favors a matching according to hue in the normal. If it be true that patients of the mentioned

²⁷ It goes without saying that in all these patients color efficiency has been ascertained by pertinent tests.

²⁸ See page 58.

*I think he has
mixed colors —
one cannot be
one does not want
to be abstract*

variety have lost the categorical approach, it is to be expected that they will refuse to assign the center skein as belonging to any one of the two others. This, as a matter of fact, is frequently the case. Nadel's finding showed that in six different problems for each subject four of his fifteen experimental testees rejected all presentations as having any relationship at all, be it hue or brightness.²⁹ However, another phenomenon is still more frequently observed than a complete refusal. Subsequent to Gelb and Goldstein's original demonstration all relevant investigations have yielded a fairly consistent preference in patients to match the center skein with the one of equivalent brightness. Ten of the fifteen experimental subjects of Nadel made inconsistent matchings on the six problems; *i.e.*, they sorted in one problem the center skein with the skein of same hue, in another problem with the skein of same brightness. Bolles found that 6 out of 8 aments and three of ten aments placed the center sample with the skein of corresponding tint, five of her aments denied any relationship whatsoever, whereas the *normal children* all matched on the basis of hue, except one who preferred the tint. A similar numerical proportion between preferences for hue and tint in normals and abnormals prevails in task 3.

Speaking of preference of brightness is, however, a misleading description. The subject actually responds to the impressions of two light skeins in sensory coherence.

If in the triple matching experiment the following skeins are presented:

Very light blue very light green very dark green

then the impressive sensory element is most easily "light" (light blue and light green). This "being light" need not be abstracted from the different shades, but it is thrust into the foreground of perception. In contrast, the common basic hue of green requires such an abstractive act, because it is sensorily not as manifest as the brightness. Therefore it would mean mistaking the results entirely, if one were to assume that the patients have "abstracted" brightness. Light tints obtrude phenomenally under these particular conditions, and not the basic hue. For singling out the hue, the patients must have the conceptual attitude which they do not possess. This is evidenced by their inability to sort according to brightness on demand. As one may formulate it, they are impaired in the capacity for voluntarily isolating a definite color denominator and for sorting accordingly. How far the dependence upon the mere sensory aspects may go, is shown in the following report by Weigl (70, p. 3). He varied the triple matching problem very instructively:

²⁹ Except for one problem in one case.

The patient was given three colors and told to place the two together which were "most alike." Whether or not the desired result came about depended on the way the colors were arranged. Thus, for example, the patient Th. (18, p. 149), when presented with a dark red, a pink, and a medium brown skein, put the two reddish skeins together. If, however, he was given a sky-blue skein instead of the medium brown one, the patient usually could not decide at all, because for him the paleness of the sky-blue and the pink "cohered" as much as the two shades of the basic color hue—red. Whereas on superficial observation it seems as if the patient reacts to the essentially identical task "correctly" one time and fails another time, the behavioral analysis shows that in both cases the patient did not respond in the way the experimenter intended, *i.e.*, to sort according to a common denominator and to grasp what was demanded of him. Since the patient is not capable of proceeding according to a definite principle of classification, his experience as to "similarity" or "dissimilarity" of two-skeins in the triad depends upon which two of the three colors impress him as belonging together most strikingly. Thus, in certain presentations the sensory congruency as to basic color tone may prevail and in others the congruency as to paleness, softness, and so forth; or two different ways of experiencing the belongingness of the two colors within the triad (one according to brightness, the other according to hue) may, so to speak, compete with each other and hold each other in abeyance, so that the patient cannot make a choice. Under the same type of concreteness falls the awkward behavior of some patients, who sort in "pairs." If the examiner removes the sample and the selected skeins from their view, the patients may be either completely at loss, or they begin to select skeins of entirely different hues. It seems as if they had forgotten the task, *i.e.*, the particular color of the sample. Yet, forgetting is not the decisive factor in this behavior. The patient cannot forget what he never possessed: the concept of the color for which the sample stands as a symbol. Deprived of the possibility of continuing his piece by piece matching on the basis of identity or similarity, he is delivered to sense-impressions of varying kind corresponding to the configuration of skeins (*e.g., cf.* Weigl protocol). Closer analysis reveals that the appurtenance he now experiences varies; the skeins he now groups together may either give the impression of similar tint, though being of different hue, or they arouse other sense-impressions which cohere; such as softness, warmth, coldness, intensity, etc.

It is possible to make a crucial experiment, which probes the different effects of sensory cohesion under varying conditions: We present a patient

who responded in the triple matching task to brightness instead of hue with a new problem. If, for example, after presentation of

sky-blue light pink dark red

the patient pointed to the light blue and pink skeins as belonging together and we then confront him with the same

sky-blue skein light pink skein heap of red skeins (various tints)

Now the patient will usually assign the pink to the red heap. Obviously the greater mass of all kinds of "reddish" tints in the heap this time favors the pink. At the same time the arrangement favors a contrast between pink and red on the one hand and pink and sky-blue on the other hand. This experiment can, of course, be varied thusly: blue heap, sky-blue, light pink, etc. In some cases we have been surprised by a response which was different than expected, but which brought out the concrete restriction of the patient in a still more striking way; the patient in the presentation red heap, pink, sky-blue, selected an identical pink shade from the red heap and placed it with the pink center skein, thereby pushing the remaining red skeins aside with a rejecting motion.³⁰

We have attempted a survey of crucial symptoms of abnormal concreteness in order to furnish the investigator with means of differentiating between an abstract and a concrete approach in this test. As in most of the experimental methods here discussed, it is not yet possible to relegate any one particular symptom to a specific defect within the range of impaired abstract behavior. Differences in degree may be indicated by a greater numerical restriction in choice, by matching exclusively according to identity and by a rigid refusal of any relationship of skeins on the tasks 2 and 3 (triple matching and two row presentation). The examiner should be cautioned against expecting consistency in the concrete behavior of the same patient; *i.e.* the patient may respond with different symptoms of concreteness to the different subproblems of the test. The salient point is to obtain a univocal decision as to whether or not the subject is able to shift to the categorical attitude. To this end the following standard instructions and crucial variations have been devised.

DIRECTIONS

The Ishihara Color Spot Test or any other standardized test is administered to ascertain normal color efficiency. If color blindness is present, this test should not be applied.

³⁰ Pt. F. (protocol Scheerer).

Experiment I. Sorting to a Given Sample.

A.

Woolen skeins of different hues and shades are placed before the subject in a random heap.³¹ During the entire test a careful record is taken of the identification number—or mark—of each skein chosen and presented; of the subject's manner of proceeding, of his spontaneous comments, which at any time should be encouraged.

All questions and answers by both the examiner and subject should be recorded verbatim.

The examiner says: "Pick out a skein which you like."

After the subject has made his choice, the examiner asks him: "Pick out all the skeins which can be grouped together with this one" (pointing to the subject's sample). If the subject does not seem to understand, examiner may vary the phrase as follows: . . . "Which can be brought together with this one, . . . which you believe belong to this one, . . . which can go with this one, . . . belong with this one."

*he must
understand
that
color sorting is
involved*

In case of other questions, examiner answers: "That is entirely up to you," or repeats the instruction.

Attention is paid to the following behavioral symptoms: hesitancy, uncertainty, meticulousness. Does the subject compare each selected skein with sample, or not? Does he reject picked-up skeins—be they correct or not—and perhaps reconsider them again? Does he throw the skeins in a separate heap or place them singly in a row or in pairs? Does he form a pseudo-series of brightness?

After subject has given to understand that his sorting is complete, the examiner determines whether the number of skeins selected is less than those of the same hue present in the heap. If so, the examiner presents the subject with other samples of the same hue (first some, then all remaining skeins), and asks: "Could they be included, too?", or, "Do they not also belong to this one?" (pointing to sample), or, "Don't they belong to these too?" (pointing to patient's selection).

Whether the subject accepts or rejects, the examiner asks, "Why?" If the subject rejects, the examiner may ask, "Is there no way in which they all belong together . . .?", "Is there no way in which they are all alike?", "Don't they all have something in common?", or "Aren't they all alike in some way?", "Why?", "Why not?".

If the subject persists in his restricted selection, or, though accepting the

³¹ They contain about 12 differently tinted skeins of each primary hue. Preferably the set of Holmgren skeins or any other set of correspondingly arranged colored skeins should be used.

added skeins, does not account for their inclusion in a verbalized concept, his response on this part of the test is scored concrete.

B.

The procedure under A is repeated with the following modifications: Examiner himself selects the sample. It is of different hue than the subject's first choice, preferably green, blue, or red. With regard to red even certain normal subjects may show a reluctance to include pink or rose skeins with the red sample; due to the special name "pink" they may take pink as a category of its own. In this case the examiner should establish whether the subject is capable of abstracting and verbalizing the common denominator "reddish" in all the skeins.

If the subject places the skeins in a row and obviously proceeds by a piece to piece comparison, the examiner

1. Takes and conceals the sample.
2. Removes the already-chosen skeins out of sight.
3. Removes from the subject's view each newly selected skein, so that the subject is deprived of his visual support by a sample. Attention is to be paid as to whether the subject
 - a. Cannot continue at all.
 - b. Begins to pick up hues different from the sample, etc.

In both instances the subject is questioned as to his reasons.

The same procedure is to be observed in case the subject has begun to form a *pseudo-series of brightness*. (Regarding other behavioral variations see also page 63 f.) Before further controls are introduced the examiner makes the following verbal inquiries: (1) Does the subject accept all the selected shades of different brightness as "being all alike in some way" (hue), or does he persistently call them by individual names. (2) Did the subject intend to form a series of brightness ("What did you want to make?", "Why do you arrange the skeins in this way?", etc.). In the instance of pseudo-series the examiner may make additional experiments, preferably interposed between Exp. II and Exp. III of these directions: (1) He asks the subject to form a series of skeins according to brightness (ascending and descending). (2) He presents the subject simultaneously with two such series of different hue, a top row of ascending, a bottom row of descending brightness, the skeins 3 inches apart.* He asks the subject whether this arrangement "makes any sense" to him, and why. Emphasis is to be placed upon whether subject is able to form the concept of bright-

* The spatial interval serves to prevent the response of sensory cohesion.

ness in a generalized abstraction. (It does not suffice that the subject says: "Each is lighter," etc.)

From his behavioral and verbal responses to task B and to the control experiments, the subject's performance is scored abstract or concrete. The criteria for the latter are: restricted number of choices and refusal to include additional skeins. In the case of pairing or pseudo-series, difficulty to proceed after suspension of visual support, or wrong matchings; in the case of pseudo-series as to brightness, inability to form these volitionally or to accept and account for them conceptually.

Experiment II. Triple Matching.

A.

Three skeins are placed before the subject in the following arrangement and sequence (a-d):

<i>Left</i>	<i>Center</i>	<i>Right</i>	
1	2	3	
a. dark red	pink	light green	2 and 3 of same brightness
b. light blue	light green	dark green	1 and 2 of same brightness
c. dark blue	light blue	pink	2 and 3 of some brightness
d. sky-blue	light yellow	tan	1 and 2 both very light of same brightness.

Each time the examiner asks: "To which of these (pointing to left and right) does this one (pointing to center) belong?" After subject's decision the examiner asks: "Why?" and then: "Why do you think that *this* combination belongs together, isn't the *other* (pointing) just as good a combination?" "Why?", "Why not?"

1. If the subject sorts consistently according to hue, can account for this in a categorical generalization, and can shift to the principle of brightness on demand, his performance is scored abstract. (Shifting to the principle of brightness may be difficult for certain normals.) In that case prompting to the extent of explaining to the subject the brightness point of view is permissible. The crucial criterion is whether the subject *accepts* the shift and the point of view of common brightness.

2. The same holds if the subject sorts according to both hue and brightness, *i.e.*, inconsistently, but can account for choices in a verbalized concept and is able to shift on demand from one principle to the other in each instance.

3. If the subject refuses to sort at all, insisting that "they are all different" and cannot be brought to accept that two of the skeins have something in common, his response is scored concrete.

4. If the subject sorts inconsistently and cannot afford to evolve the

principle of his choice or to shift as demanded under 1 and 2, his response is scored as concrete.

5. If the subject sorts according to brightness and can neither account for the principle in a verbalized concept, nor shift on demand as under 1 and 2, his response is scored concrete.

In the case of 3 through 5 there may be doubt as to whether the subject's verbalization contains a true reference to the concept of hue or brightness. As explained elsewhere the subject may utter general names without using them with that implication; he simply expresses in that way his experience of sensory cohesion or of a particular sense impression without the words having a general meaning for him. For example, he says: "Light color, they are both bright, they are both dark, lighter, etc."

B.

In order to ascertain the operation of the factor of sensory cohesion or the existence of true conceptualization, the following experimental variations are indicated. Present the subject consecutively with the following tasks 1-5:

LEFT a	CENTER b	RIGHT c	SKEINS OF EQUAL BRIGHTNESS
1. Heap of red skeins all tints present	pink skein	sky-blue skein	b and c
2. Pink skein	light green	heap of green skeins all tints present	a and b
3. Heap of blue skeins all tints present	sky-blue skein	light green skein	b and c
4. Heap of red skeins all tints present		heap of green skeins all tints present	
5. Heap of blues all tints present	light pink skein	heap of reds all tints present	

Repeat the triple matching of experiment II A with tasks 1, 2, 3, 5. Corroborate the responses in these tasks with the responses to the corresponding color trials in experiment II A. If the subject has sorted in II A according to brightness, but assigns the center skeins to those of same hue in the above tasks, then the evidence points to sensory cohesion.³²

In task 4 arrange the skeins loosely in both heaps on the table, but with a distinct margin between them. Ask the subject: "Do all these (pointing

³² See page 92 of this paper.

to red heap) belong together?" Repeat the question with regard to the green heap. Ask the subject for the reasons for his answers. Corroborate this *sorting* of the subject and his answer in this task with the number of spontaneously sorted and accepted skeins in experiment I and with his answers in that test. If the subject accepts the belongingness of the skeins in either heap in task 4 but has not included all skeins in experiment I nor accepted additions, the evidence points to pathological concreteness and to the factor of sensory cohesion.

A further experimental variation of triple matching can be added as follows:

	<i>a</i>	<i>b</i>	<i>c</i>	
1.	Dark red skein	light brown skein	light pink skein	b and c
2.	" " "	sky-blue skein	" " "	of equal brightness

In both tasks the normal will sort according to hue. When, on the grounds that pink is a color in its own right, he should refuse to sort at all, he will be able to conform with the examiner's suggestion to sort those which belong *better*—and choose the hue as basis. The abnormal individual will either (1) persist in his refusal ("They all are different") or (2) sort inconsistently, e.g., in 1 according to hue, and in 2 according to brightness or (3) sort in both cases according to brightness.

Experiment III.

Examiner asks subject: "Pick out all you call green." After the subject's choice, examiner repeats the procedure of experiment I as it there succeeds the subject's act of grouping. After completion the examiner does the same experiment with red and blue.

Experiment IV.

Two rows of skeins, each containing six samples, are placed before the subject.

Row 1. Six shades from dark red to light pink.

Row 2. Six equivalent brightness shades of different hue:

Purple, brown, blue, red, green, yellow.

Examiner asks the subject: "Which group do you think belongs together better?", or "Which of the two groups is more alike?—Why?" If the subject prefers Row 2, the examiner asks whether the other group could not make "as good a combination" as the one subject preferred. If subject answers "Yes" examiner asks why; if "No" examiner asks why not.

1. If the subject refuses to acknowledge that the skeins belong in *either*

row, indicating that each skein is different, and cannot be induced to accept a common conceptual denominator, his response is scored concrete.

2. Persistent preference for the brightness equivalents and refusal to accept the other row is scored as a concrete response. This is especially indicated when the subject calls the skeins in Row 1 "all different" and is unable to evolve the principle of brightness conceptually.

3. If the subject accepted either of the two rows on the basis of a specific situation or use ("good for a jumper," etc.) the examiner repeats the question regarding the non-preferred row. If examiner cannot induce a shift to a conceptual understanding of either hue or brightness, the performance is scored concrete.



FIG. 11-A



FIG. 11-B

THE G.G.W.S. OBJECT SORTING TEST

[GELB-GOLDSTEIN-WEIGL-SCHEERER] ³³

DESCRIPTION OF TEST

The purpose of this test is to determine whether the subject is able to sort a variety of simultaneously presented objects according to general concepts; to shift these frames of reference volitionally. The selection and arrangements of the objects used in this test allows for this. Two sets of objects are used, one for males and one for females (see figures 11a and 11b).

OBJECTS FOR MALE SUBJECTS

<i>Article</i>	<i>Material</i>	<i>Color</i>	<i>Form</i>
Toy Spoon	Metal	Silver	Oblong
Toy Noise-maker	Wood	Brown	Oblong
Toy Hammer	Metal and Wood	Silver and Brown	Oblong
Toy Dog	Porcelain	White	Small
Chocolate Cigar	Food	Brown	Cylinder
Ball	Rubber	Red	Round
Candle (small Xmas)	Wax	Red	Cylinder
Play-Chip (small)	Bakelite	Yellow	Round Disk
Play-Chip	Bakelite	Red	Round Disk
Plate (small)	Wood (can be taken for ash tray or food plate)	Red	Round
Pipe	Wood	Brown	Curved
Match-Box (filled, partly open)	Cardboard	Red	Rectangular
Cigar	Tobacco	Brown	Cylinder
Matches (2, loose)	Wood	Yellow	Cylinder
Table Knife	Metal	Silver	Oblong
Table Fork (Small)	Metal	Silver	Oblong
Large Table Fork	Metal	Silver	Oblong
Apple	Wax	Red	Round
Sugar (2 pieces)	Food	White	Rectangular
Crackers (2)	Food	White	Square
Screw-driver	Metal and Wood	Silver and Red	Oblong
Pair of Pincers	Metal	Silver	Oblong
Bicycle Bell	Metal	Silver	Round
Padlock	Metal	Silver	Round
2 Nails (loose)	Metal	Silver	Cylinder
Nail driven half-way into piece of wood	Metal and Wood	Silver	
Large Candle	Wax	White	Cylinder

³³ After Gelb und Goldstein, Weigl, Scheerer. See 18 and 70. In this text we have included the data gathered in subsequent investigations by Rothmann, Bolles and Goldstein, Goldstein and Scheerer.

OBJECTS FOR FEMALE SUBJECTS

Article	Material	Color	Form
Book (novel)	Linen (bound)	Red	Rectangular
Travel Guide	Paper (unbound)	Green	Rectangular
Song Pamphlet	Paper	Green	Rectangular
Pencil Sharpener	Stone	Green	Rectangular
Penholder	Wood	Green	Oblong
Small Pencil	Wood	Red	Oblong
Red-Blue Pencil	Wood	Half Red and Half Blue	Oblong
Letter Opener	Metal	Silver	Oblong
Eraser	Rubber	Silver-Grey	Round
Ash Tray	Wood	Red	Round
Tape Measure	Metal	Silver	Round
Top of Darning Block	Wood	Brown	Round
Spool	Wood	Black	Cylinder
2 Knitting Needles	Wood or Bone	White	Oblong
Small Scissors	Metal	Silver	Oblong
Knife	Metal	Silver	Oblong
Fork	Metal	Silver	Oblong
Napkin Ring	Glass, Metal, or Wood	White	Round
Skin Cream	Glass Jar	Blue	Round
Toy Knife	Metal	Silver	Oblong
Toy Fork	Metal	Silver	Oblong
2 Crackers	Food	White	Square
2 Pieces of Sugar	Food	White	Rectangular
Apple	Wax	Red	Round
Ball	Rubber	Red	Round
Candle (small Xmas)	Wax	Red	Cylinder
Needle (for sewing)	Metal	Silver	Oblong
Candle (large)	Wax	White	Cylinder
Thimble	Metal	Silver	Cylinder

- In the following we will refer chiefly to the set of articles for males.
1. The subject is first asked to group articles with an object which he has selected himself; then, to group articles with one the examiner selected. (Phase I. Handing-over.)
 2. In the second phase of the test subject is asked to group *all* the articles as he thinks they belong together. (Phase II. Sorting.)
 3. After completion subject is asked to arrange all articles in still another way. If he does not comply satisfactorily for one reason or another, he is presented with *new* groupings by the examiner and asked why they are grouped together in that way, whether this arrangement makes sense to him and whether he can accept it. In every stage of the test the subject is asked to explain why he grouped the articles as he did or why he accepted groupings.

One can place the articles together according to different aspects; the most important are enumerated as follows:

1. Use—the aspect of use can pertain to any one of the following:
 - a. Tools.
 - b. Eating utensils.
 - c. Smoking utensils or material.
 - d. Edibles.

2. Situation—belonging together in a concrete situational context; e.g., all eating implements for setting a dinner table, all tools in one's tool case at home, etc.

3. Color—such as silver, brown, white, red, etc.; for instance, in each of the five mentioned groupings, one object is of equally intensive red (red cardboard disk, red apple, red ashtray, red candle, screw driver with red handle).

4. Form—in each of the five groupings at least one object is oblong and also one object is round (e.g., noise maker—ball; cigar—plate (ashtray); screw driver—padlock).

5. Double occurrence in pairs—in each of the groupings an object is represented in two samples (e.g., 2 lumps of sugar, 2 chips, 2 forks, 2 loose matches, 2 nails, etc.).

6. Material—the articles can be assorted according to the aspect of material, as for instance, metal, wood, food, etc. In this case the number of objects of different material is irregular.

The spatial arrangement permits any one of the mentioned groupings.

BEHAVIORAL ANALYSIS

The Two Approaches

A person who is asked to sort the articles can usually produce any one of the mentioned groupings; however, the procedure by which one individual arrives at his grouping may be totally different from that of another individual. Moreover, the same person may, at different occasions, produce the same groupings, although each time by virtue of a different way of "thinking." Therefore, it is imperative that the examiner determine, in each instance, why and on what basis of pertinence the subject has evolved his sorting.

Which are the possible bases of pertinence? In the case of a normal subject two types of approach are possible; an abstract and a concrete one. In the abstract approach the subject volitionally transcends the immediate impressions of the given articles and is oriented by a conceptually-developed frame of reference. The subject brings objects together according to a general *class* concept, like metal, wood, color, etc. He is conscious of his frame of reference, can account for it to himself or others, and can volitionally shift his sorting from one class of articles to another. In this approach the presented articles are not taken as *individual* things, but as representatives of a category. The subject deliberately disregards, abstracts from, the concrete singularity of the presented article. He can abstract from the

immediate manipulative valence of the articles or from their situational context with others. He can abstract from the perceptual belongingness of a given object with others, *e.g.*, from its sensory cohesion with properties of another object.

In the concrete approach the subject brings objects together according to the way they belong together for him in a specific situation. The subject is either passively dominated or volitionally oriented by an attitude in which he surrenders to the impressions as they arise from the articles. These impressions have a quality of realistic appurtenance to a situation. The situational context can be classified as to the following types.

1. *Actual manipulative valence*: Fitting the objects together according to their *factual usability* in the present situation, *e.g.*, eating utensils or smoking utensils.

2. *Personal context of action*, momentary or non-immediate. Fitting the objects according to the way one *subjectively* experiences their appurtenance to a situation; *e.g.*, a subject sorts the piece of wood and the nail together with the hammer, because "you put the nail in the wood with the hammer"; he then adds the white candle "because you make a light when you hammer."

3. *Familiarity*: Fitting the objects according to one's past experience with them; *e.g.*, having seen all toy objects in a toy store or all metal objects in a hardware store.

4. *Sensory cohesion*: Fitting articles together according to how they cohere together sensorially. This term denotes the concrete experience of like form or color, *e.g.*, the redness of two or more articles. This redness, etc., is a unitary "Gestalt" and comprises the two objects, both being members of that embracing color whole. The subject does not have the primary experience of two *separately* apprehended objects with two similar colors in juxtaposition, thereafter abstracting a common property, the color red. The subject, rather, surrenders to one immediate unitary color impression, and the two (or more) articles are parts of that sustaining totality as an experiential whole.

The normal is capable of adopting both approaches, the concrete and the abstract, and usually will make groupings of both a concrete and abstract nature. If in the beginning he made concrete groupings, he is able later, either at will or upon demand, to adopt abstract references for his sorting. He also will be able to accept "abstract" groupings when presented with them by the examiner and to derive their principle even in the case that he did not conceive of them himself before. Yet, as has been shown elsewhere,

It is characteristic of this test that any one of the mentioned groupings can be produced on a basis of an abstract approach, as well as on the basis of a concrete one. To illustrate: The aspect of use can prevail as a *category* or as a concrete functional belongingness of articles. (The tools, toys, etc., as representatives of the *class* of tools, toys, instead of "things for carpentry," "things for playing" in a definite situation.)

Also color, form, material can prevail in the grouping of objects either as a categorical meaning or as an immediate unanalyzed impression. If intentionally segregated as a common element in the sense of a *class* or as a symbol, the subject "knows" that he has disregarded the functional qualities or others pertaining to the objects. It is therefore paramount to appreciate the fact that we can have the same groupings, but produced by either a categorical or a concrete response. Since this difference in approach with identical results entails a highly subtle and intricate psychological problem, we have to analyze the relevant factors more in detail.

It is noteworthy that in the concrete attitude the activity of the subject is not primarily directed towards an isolated object, but oriented towards the total configuration of the articles. This fact has also been stressed by Meili (53): "Not, that the subject said to himself 'Before I can make a good grouping, I have to attach to this *particular object* a functional value. Let me see what function I can attribute to it.' The procedure is much more unreflective and non-conscious." In fact the functional value of the individual article depends upon the *context or sphere* which thrusts itself in the foreground at the moment of the subject's surveying activity.

Of course, *the nature of this activity* differs with various individuals, the circumstances and the configuration of the objects. It runs the gamut from the just-mentioned unreflective view to a differential emphasis and lastly to an inspection by abstractive isolation: Thus it may be one of a passive, indifferent surrender to the total impression (1); or may be governed by definite, situational vectors (needs, impulses, valences) (2); it may be a preconceived selective approach which is consciously oriented towards certain categories of objects (3). We can observe phenomena fitting the described types in certain life situations. We know that if given over passively to the sight of clouds moving along the sky, certain configurations emerge, fuse, divide, and reorganize phenomenally (1). If a soldier after a battle in bitter cold enters a shelled and abandoned house, the contents of the house may immediately present themselves to him in two palpable groups: easily burning material and an indifferent remainder (2). A physician who hurries to a patient and attentively watches out for a taxi, may

consciously concentrate on yellow cars, disregarding all others, because he knows that taxis in this city are yellow (3). If proceeding concretely (1, 2) the subject may form or accept groupings of *common* manipulative or practical use, of *like* color, form or material; however, his response was not based upon the generalized, pertinent principle, *i.e.*, the class concept in the abstract; neither was the subject conscious of such, nor has he unconsciously and involuntarily abstracted such common properties. His response was entirely naïve. The subject unreflectively apprehended a definite organization of the articles which thrust themselves upon him as a palpable context of grouping; this may be a sensory cohesion in the "sphere" of color, form, material, or a congruency in the "thing sphere."

To explain this as a process of involuntary abstraction is an assumption as unnecessary as it is false. That we are rather dealing with a procedure which lacks any conception of the common denominator could be shown by control experiments concerning the problem of *shifting*. Weigl made an experimental analysis of how his subjects arrived at their various groupings. His findings corroborate the distinctions previously pointed out by Gelb and Goldstein and the findings in recent investigations of our own, which can be summarized as follows: If a normal subject has completed his grouping and is asked to reassemble the articles in another way, he can do this by shifts of entirely different nature. In normal subjects one can distinguish four kinds of "shifts."

I. A *passive* shift within the purely *phenomenal* realm. In this case the shift takes place within a given unreflectively-apprehended context or "sphere"; e.g., from the "thing sphere" to the "color sphere," etc. A new organization of articles forces itself upon the subject as a concrete experience; the subject who first responded to *one* definite organization of articles perceives, unreflectively, a *change* of context (sphere); with this change of palpable context there instantly changes the immediate experience of congruencies and respective belongingness of the articles. This change within the phenomenal realm of organization occurs as a *shift in aspect*. Any one of the aforementioned experiential aspects; such as tools, toys, roundness, oblongness, metal, wood, food, can thrust itself phenomenally in the foreground and push the formerly predominant aspect in the background.

II. An *active* shift, initiating by conscious will a change of aspect within the purely phenomenal realm. When formerly oriented towards the context of use, the subject may now shift his orientation towards the aspect of play, eating, smoking, etc., and thereby change the functional value of individual articles.

III. An *active* shift from this sensory, *palpable* realm (*e.g.*, sense impression of "redness") to a *conceptual* reference (*e.g.*, to the "category of color" or "category of material"). A case in point is, for instance, when the experience of a red spot of color gives rise to volitional sorting according to color in the categorical sense.

IV. An active shift *within* the conceptual frame of reference (*e.g.*, from the *category* of color to the *category* of form, of tools, etc.).

The shifts II-IV have the following characteristics: The subject transgresses the immediate, existential reality of the objects by regarding them from the point of view "of the mere possible." This orientation towards the mere possible can be directed either to another situational aspect, as in shift II, or toward conceptual references, as in shifts III and IV. In the latter shift the independence from immediate reality can go so far that the subject behaves as if he were dealing solely with the *names* of the experimental objects; he enumerates them as different possible class concepts in a purely categorical way.

It has been conclusively demonstrated that the three last mentioned kinds of shift positively require a *voluntary act of abstraction*. They demand the activation of abstract attitude in a univocal form, that is, as a volitional behavior. Patients with functional disturbances of the brain cortex are unable to enact this behavior. To probe this appropriately, crucial experimental arrangements of the type as have been introduced by Gelb, Goldstein, and Weigl are necessary. We will deal with these and our new crucial experiments in greater detail after having described certain essential criteria for the concrete responses on this test and presented some protocols.

CRITERIA OF CONCRETENESS

Reality of use. Uniqueness. The outstanding characteristics of concrete responses is their closeness to immediate reality. This dependence upon reality runs a gamut of degrees. One can consider them to be levels of increasing detachment from immediate claims of the situation; or, to put it differently, there exists a "reality scale" of concreteness.

Sorting on the most concrete level, therefore, is confined to the aspects of use or manipulation of the individual articles in their uniqueness. Hence we find that a subject who responds very concretely will usually either refuse to group other articles with a given one or will sort only a few articles to go with it. For instance, the patient F. (9, p. 20) selected a cigar from the group. When asked to choose all that belonged with it, he stated that there was nothing else. Other smoking materials (cigarettes, matches)

were then placed before him and he was asked whether these could not be said "to belong" with the cigar. The patient said: "No, they are not cigars." Patient E. when asked what belonged with or was similar to the bicycle bell, responded: "Nothing belongs with it. There's no bicycle."

A subject of concrete type will, e.g., in the phase of "handing over," sort with the ashtray only the cigar and the half open matchbox, but will not include the two loose matches and pipe, "because matches are already in the box" and "there is no tobacco in the pipe for smoking." While he may place the pliers with the nail partially driven into the wood, he will refuse to add the toy-hammer, either "because the nail is already in the wood," or, "because one cannot use a toy-hammer for driving in a real nail." In the first experiment of this type a patient refused to group a corkscrew with a bottle from whose neck the cork was partially protruding (it was loose)—"because you need no corkscrew for opening the bottle" (18, p. 182). A subject who sorts together candle and matchbox, may be willing to add the cigar, but rejects the chocolate cigar—"because you cannot light it."

It is, therefore, understandable that on this level of concreteness a subject will not include a large variety of articles. His realism is a block against disregarding the tangible unique properties of every object that he tries to include with others; he cannot transgress the actual, existential and envisage "the mere possible."

| *Preference for pairs ("Mates").* Consequently we find, particularly in the phase of handing over a decisive preference for pairs, e.g., fork and knife. Patient R. persistently picked up with both hands two articles at a time, thereby forming 10 pairs (Virginia cigar—matchbox; Apple—knife; Fork—spoon, etc. (70, p. 22). Bolles (8, p. 29) found that aments and dements showed a high frequency in selecting the other member of a pair as the only one belonging with a particular object. This can be codetermined by rigid dependence upon familiarity. In any event, the instances in which only the other member of a pair is brought together with a given object, indicate that the latter is not taken as a representative of a class. If it had been so taken, more objects belonging also to this class would have been chosen.

Reality of specific situation. A less realistic level of concreteness is present when the subject while sorting according to use, is more oriented towards a specific situation in which the articles are being or were used. In this case the subject may bring together the toy-spoon with the regular fork and knife for eating, not being particular about the toy-spoon as a toy—

which does not "fit" to an action in the confines of rigid realism; since a real spoon is missing, the toy-spoon is experienced only from its function in the eating situation. Because of its smallness it may now be experienced as an egg-spoon. Therefore, the inclusion of a toy-spoon among the eating utensils need not indicate an abstraction, unless confirmed by other evidence. In the same sense a subject may group the toy-hammer with the real tools, not because he abstracts from its toy quality, but because a real hammer is missing. This fact thrusts the toy quality of the hammer perceptually into the background, so that the hammer property of this "thing" obtrudes phenomenally; the hammer can fit the situation of dealing with tools because of an experienced tendency towards "closure" of the tool situation.

In both cases the toy quality is experientially absent in the subject. This kind of orientation towards situational valences may also pertain to other sets of objects.

For example, to sort the two loose matches or the chocolate cigar with the smoking utensils is less rigidly realistic than to exclude them. Yet the subject need not have abstracted from the chocolate quality—he simply did not become distinctly aware of the chocolate-reality owing to this present situational set: Smoking utensils. Only careful analysis can determine whether this is a true abstraction, *i.e.* a conceptualization or not. As long as this categorical attitude is not operative in his behavior we can merely state that here the subject responds within the confines of specific, situational realism, within somewhat less rigid scope of realism than in the stage of matching. The subject is not bound to one immediate uniqueness of the article, though he still reacts concretely. To this level belong particularly the responses based upon past experience of familiarity. Thus, a patient puts all the tools together, giving the explanation: "I have them all in my tool chest" (8, *p.* 29). In other words, more objects can be included on this level of situational concreteness. Yet the subject still acts within the confines of a definite situation. Patient Sch. sorts the chocolate cigar with the toys, saying: "If the child behaves well, then one should give him something sweet." Asked whether one could also put the chocolate cigar with the matchbox, he answers, "No, the matches are for the grown-up and this (chocolate cigar) is for the little ones" (18, *p.* 155).

Patient B. (18, *p.* 180) grouped together the pipe, the matches and the toy-spoon "for cleaning the pipe," but indignantly "missed" the tobacco and later on, also the key in the padlock. Another patient (9, *p.* 11) was handed the cigar; he proceeded to pick up a single match and then the

matchbox: "If it is a good cigar, would only need one match, if not, use the whole box." When asked if a cigarette could not also be included, he said: "No, those who smoke a cigar don't want a cigarette." The same patient, asked to sort any article with the rubber ball, refuses, stating: "Nothing that's there belongs with the ball, because there isn't a glove" (meaning to say that he can't play handball without a glove).

Reality of a non-immediate situation. The situational dependence of the sorting can transcend the immediate reality aspect of the articles. The subject groups objects in their appurtenance to a situation or according to a personal action content that he associates with them. For example: Subject He. (70, p. 29) repeatedly "handed" series of as many as 17 objects and sorted "groups" of as many as 8 objects:

As the first object of departure, the subject chose the apple and handed over 16 objects to go with it, in the following order; knife, 2 lumps of sugar, bread, chocolate cigar, Virginia cigar, 2 forks, doll's spoon, pipe, matchbox, 2 matches, 2 candles, plate. On completing the series she gave us these bits of observation upon herself: "I constantly had a story in mind. By the apple I was led to the situation of eating. This demanded knife, fork, spoon,—really a whole cover. In looking for this, I saw these 'impossible' eating utensils and got a real shock. Then I consciously adjusted: 'But they aren't toys'; at this moment the objects were no longer impossible; they fitted the situation of eating; it was as if they were 'changed.' I went on from one thing to another and could no longer separate. It could have gone on this way for hours. So to speak, a chain of little circles, which were hanging together." In another series with the bicycle bell (as object of departure), the subject handed: padlock, pincers, hammer, wood, screw driver, and stated that in handing over the lock and pincers she had the idea of a bicycle kit in which these two things belonged. Suddenly—on perceiving the hammer—she had been led to the situation of fussing about the gadgets and this caused her to hand the wooden board and the screw driver. It struck her especially that the objects had frequently changed their significance according to the particular object of departure to which they were related. Thus, for example, the plate had functioned as "eating plate" (objects of departure: apple, toy dog, and fork), and "toy plate" (objects of departure: little plate and ball), and as "ash tray" (object of departure: Virginia cigar). In the second phase of the experiment, the *sorting* of all articles, she made "drawers" just as if she had had a "cabinet at home with many things to arrange in it." In doing this she formed the following groups: (1) tools, (2) edibles, (3) toys (plate, ball, chocolate

cigar, 2 little plates, spoon, noise maker), (4) table silver, (5) match box, 2 matches, 2 candles, (6) Virginia cigar and pipe.

This kind of behavior evidently is characterized by the following factors: the subject is neither oriented towards a class concept nor is she bound to the given attributes of the objects. She may become temporarily disturbed by the fact that objects fit together poorly; however, she can "consciously adjust" by viewing them in the context of another situation which then tinges the functional aspect of the articles with a new light, changing their 'unfitness' into 'fitness.'

Hence there occur shifts of a definite nature. The subject shifts within the situational realm either volitionally—"I consciously adjusted: but they aren't toys") or passively—"by the apple I was led to the situation of eating"). Therefore, we may speak here of an abstract (active) and a concrete (passive) shifting. Since, however, in every instance the shifts were guided by an action in a story-like "sphere," we would not consider this a final proof until we find that the subject can also shift to a conceptual level.

Such a reality of non-immediate situations prevails also in the responses of pre-school children; only their shifting is of a more primitive type, more strongly determined by the functional valences the articles have in a personal action-sequence. The four year old Mo. comments while handing over the bicycle bell and small candle to go with the padlock "so that one can make a light in the evening if one puts the lock on down in the cellar." The seven year old Sti. (70, p. 27) accompanies his handing of objects to go with the toy hammer with the following statement: (gives noise maker) "One can make that with the hammer," (gives white candle) "since you make light when you hammer," (gives match box) "to light candle," (gives bread) "since you eat when you are hungry," (gives pipe) "and then you smoke afterwards," (gives toy dog) "and then doggy must keep watch while the man is away." This tendency of children to bring objects together in connection with a story-situation has also been noticed by Bolles (8). One child said a particular group of objects was "for a party": the candy and the silverware were "to eat with," "and then the presents." A subject of Weigl according to his own account places together all the articles which a mechanic needs and thereby disregards entirely whether the individual articles are fitted for use or not. Certain demented selected objects like all the silverware and tools, not as implements of use but because they "were instruments of death." It seems that their common sensory impression of

being pointed aroused a physiognomic experience of threatening or of weapons. In all instances we are dealing with a concreteness which is realistic with regard to the situational context, but not with regard to the articles proper. This type of response can be highly variable and manifests a great number of shifts which all take place in the realm of situational belongingness. This apparent shifting can be just as well a symptom of pathological fluidity³⁴ as it can be the expression of a normal versatility.

Sensory cohesion. Since the reality aspect in its above-characterized gradation prevails on the concrete level, it happens but rarely that a subject *spontaneously* sorts according to color, form, or material. Usually such sorting constitutes a real abstraction, because we have to disregard use and all other properties of objects, if we single out their likeness as to color, etc.³⁵ Under particularly favorable conditions, however, concrete sorting, guided by the sense impression of congruency in color, form, or material may take place; or the subject may accept naïvely a suggestively-presented grouping of this kind, for example, if the subject is confronted with all red articles together in one group and all other articles in another group; he may accept the red group and even discover the like colors. Or, if all metal articles are placed together in perceptual contrast to the rest of the objects, the metal qualities may come into phenomenal relief. In either case there need not be any understanding of the conceptual principle involved. One of many examples: A *red* cardboard circle, a *red* ball, and a *red* screw driver were placed together. (Why do these belong together?) "This is for work (screw driver), this is for play (ball), this is a marker, a sort of target (circle)." (Could we say that they are all *red*?) "Well, all *red*, maroon, light *red*, or dark *red*." A large group of metal objects were placed together and the question again repeated. "Alike in the way of being used for something. Can use the lock to show people that you are not in. Ring the bell for warning. Could hang a coat on a nail if it were on a wall." (Could we say they are all *metal*?) "Well, have some *metal* on them, but they are not all *metal*" (9, p. 11).

This phenomenon of responding to experimentally induced coherence of articles of like material, form or color is pivotal for the problem of determining the presence of abstract behavior in general and particularly for this test. At first we have to state that the most realistic type of concreteness almost never overcomes the aspect of use.³⁶ Therefore, subjects restricted to that level will commonly fail to shift *spontaneously* in their phenomenal

³⁴ See page 3 of this paper.

³⁵ Cf. also Meili (53).

³⁶ See also Meili (53).

organization from the context of use, from the thing-sphere, to the color-sphere (or sphere of material). Consequently they mostly even reject groupings presented to them on such a basis, and lapse into the pertinence of use. Under particularly coercive conditions, however, the sense impression may push the color element into the foreground and the aspect of use into the background so that a temporary transition from the "thing-sphere" to the "color-sphere" can occur. The subject may then, almost taken by surprise, accept the presented group and even acknowledge it verbally without having formed a generalized concept. If a subject exclaims: "Oh the color," or "Oh yes, they all are red," or "Oh wood and metal," this does not justify the conclusion that he, because of this utterance, has insight into the "common denominator" of the group in the abstract. He may simply describe his unreflective sense experience or enumerate the color impressions, etc., of each article in a *seemingly* abstract word. The patient described above could not understand that one can form a group of objects based on their similarity of color. If urged in this direction, he enumerated each shade of red of each article. The same performance was evidenced with articles of similar material (metal). He understood what the word metal meant and used it, but he could not consider objects as belonging together, because they were all metal. This brings us back to the ambiguity of language, its potential dual aspect. For this reason no examiner should content himself with such statements, if the rest of the *test performance* did not ascertain beyond doubt the subject's ability to adopt abstract frames of reference. In the case of doubt the test has to be varied in such a manner that from the performance proper a decision can be reached. Verbalization on the subject's part can only be evaluated so long as it is part of the performance; that is rejection or acceptance of the patient in a crucial experiment, also expressed in words. In order to illustrate the experimental task here involved, we attach two protocols by Weigl and Rothmann, the first dealing with a male, the second with a female patient.

PROTOCOL BY WEIGL

Sorting of Objects under Particularly "Coercive" Conditions (especially with regard to shifting)

Experiment in threes. "We now presented him with three objects, for example, Virginia cigar, match box, pipe. The patient is to put together those two objects which "fit together best." He decides, in this case, on the Virginia cigar, and match box. He refuses to put the pipe with the match box, with the following explanation: "Because there is no tobacco

in it." The following statements of the patient show how strongly his responses in these experiments are determined by practical use, realizable in the situation of the moment: (knife-apple-fork), "The knife belongs with the apple rather than with the fork": (bread-knife-sugar), "The bread goes with the knife, but not with the sugar" (numerous other subjects felt immediately that bread and sugar belonged together as edibles). In contrast to most of the other subjects, he does not even consider putting the chocolate cigar and the match box together. Of two possible groupings, always the one "close to life" is the one convincing to him.

Very similar results were obtained with another patient B. Presented with a Virginia cigar, pipe and match box, he too placed the cigar with the match box. To put the pipe with the match box made no sense to him. "There is nothing in" (in the pipe). Presented with apple, bread, and ball, he groups the apple with the bread. He refuses to place the apple together with the ball (form), in spite of the examiner suggesting this as another possibility.

Sorting of objects according to "material." The patient is presented with two piles of objects. In the one are only objects made of *wood* (stethoscope,³⁷ two pen holders, handle of a hammer, pencil, two spatulas); in the other pile are only objects made of *metal* (padlock, doll's spoon, bicycle bell, razor, two nails, pair of pincers). The patient is to say whether he finds "any sense in this arrangement," whether it "is right this way." For a long time he looks at the set-up, completely puzzled. Even the assurance of the experimenter that there are quite definite common elements among the objects in each pile does not add anything to the comprehension of the patient.

Experiment I. The examiner takes a nail out of the one pile and the wooden handle of a hammer out of the other; asks the patient to put these objects where they belong among the other objects. Patient puts the nail with the wood and the handle with the metal. When asked why he did it in this way, he says, "Well, doctor, you, that way too." (He means to say that the experimenter took the objects from these positions.) The examiner repeats the experiment with the same objects, but in such a way that the patient has no idea where they were taken from. Uncertain and hesitant, the patient glances back and forth from the objects in his hands to the two piles. Finally he decides (still very uncertain), and puts the nail with the wood. Immediately thereupon he evidently intends to put the hammer handle with the metal, but suddenly stops, and cries out

³⁷ This was made of wood.

animatedly, "Oh, now I know." Absolutely certain and determined, he now puts the two objects on their proper piles and says, "Wood-iron." *The patient does not arrive by himself at the two groups of: "Wood-iron," but this duality forces itself upon him phenomenally and unreflectively;* he is taken by surprise with this palpable experience. The abruptness with which this occurred expressed itself unmistakably in the whole behavior of the patient. His features suddenly changed, he struck his head with his palm, and he had an absolute need to explain his experience to the experimenter (which is made difficult by his aphasia).

Experiment II. In order to ascertain whether this apprehension of the difference "wood-iron" made it possible for the patient to sort categorically according to "wood" and "iron," we mixed up the objects of the two piles, presented them unarranged to the patient, and instructed him to sort them. Without hesitation he obeys the instruction and puts the two piles together again quite correctly. In doing this he proceeds very carefully and pedantically, examining every object very exactly to see what material it is made of.

On first glance the result of this experiment does not seem to agree with our assertion that it is impossible for the patient to sort the objects according to a principle of classification. *It looks as though he had actually sorted according to "material" like a normal person.* If the patient had really succeeded in this, if he had finally arrived at the principle, then it would make no difference to him if he were given additional materials to sort, besides wood and iron.

Experiment III. The following objects were added to those already used: a rubber ball, a blotter, a clean piece of paper, a full inkwell. All the objects were mixed up and presented to the patient unarranged; the instructions were the same as in foregoing experiment. The patient looks at the set-up for a long time and then hesitatingly takes the inkwell and puts it in a horizontal row along the edge of the table at intervals of several centimeters (inkwell—stethoscope (standing up)—two pencils (together)—bicycle bell—pincers—padlock—paper).

We were amazed by this kind of arrangement. Our efforts to obtain from the patient a clear explanation of his motives for it were unsuccessful. Evidently it was for him only a question of "putting the things in order." The sequence of the objects, as such, had no special significance. This was confirmed when the examiner changed the order of some of the objects and asked the patient "whether one could do it that way too." The patient immediately agreed to this exchange of position.

Since the patient had seemingly forgotten his reaction of Experiment II (wood-iron), the experimenter mixed up these same objects, presented them to him again, and instructed him to sort them again. These hints, however, were unsuccessful. The patient again takes the inkwell and starts a new series with it, similar to the one in Experiment III. He does not get the idea of sorting according to "material."

Experiment IV. The four new objects are removed. The patient looks over the set-up for a short time, then suddenly says, "Oh," with an understanding smile, and promptly arranges two piles: wood-iron.

The result of this experiment teaches us that the changed reaction in Experiment III cannot simply be attributed to the patient's "*forgetting*" a principle of classification (material), which he had once grasped. *But rather the addition of the four objects had evidently modified the set-up for the patient in such a way that the distinction: wood-iron, was phenomenally no longer present for him.*

Experiment V. The circumstance that the patient in Experiment III continually stretched out his hand toward the inkwell, led us to suspect that the changed behavior of the patient was caused by the large size and conspicuousness of this object. The examiner, therefore, mixed up the objects of Experiment IV, added *only* the inkwell, and presented them to the patient. Looking over the set-up, the patient suddenly sees the inkwell and reacts just as in Experiment III: he starts a series of objects beginning with the inkwell. The repeated instructions of the examiner to sort exactly just as before (Experiment IV) do not detract him from this response.

Examiner presents the original set-up (wood-iron), only augmented by the inkwell, but expressly instructs the patient to pay no attention to the inkwell. But the patient did not succeed in so doing until the examiner covers it with his hand. *Now the patient again arranges two piles.* After he is finished the examiner uncovers the inkwell and points to it with a questioning gesture. At first the patient is stuck; then, however, he says quite suddenly, "Oh glass," and places the inkwell by itself.

PROTOCOL BY EVA ROTHMANN (61), FEMALE PATIENT

(Regarding the articles mentioned see Fig. 11b, page 80.)

Experiment I. Patient, nodding to the instruction, starts by taking the knife saying to herself "first this." Prompted by the examiner to tell something about what she is doing, the patient, pointing to the knife, says: "Fishknife" (it was shaped like a fishknife). *Group I.*

Then she takes the red pencil: "Is pencil," reaches out for the red-blue pencil: "Another pencil," then for the eraser: "With this fits the eraser"; finally, she takes the ash tray: "Ash tray can also be added." *Group II.*

Patient places the darning block with the tape measure: "That together are sewing things." *Group III.*

Now she puts the pencil sharpener to group II, saying: "Here is a pencil sharpener." . . . Thereupon she selects the book, the travel guide, the song pamphlet: "They are all books." However, in assembling them she becomes hesitant and says, pointing to the guide: "That does not really belong here, because it is a travel guide—neither does this, this is 'The singing hour'" (reading this title of the pamphlet). Undecided, she places the three books one beside the other, saying: "Perhaps each separately."

Patient places the scissors in Group III, takes the letter opener and says hesitantly: "That is a letter opener" (placing it with Group II)—takes the knitting needle and after questioning whether it was for knitting, puts it with Group III. Reaches out for the skin cream, laughs and places it *with the travel guide*. On questioning, she explains: "Air and sun. To rub into skin" (names the trade-name of the cream). "There is some stuff in it, for example, if one goes bathing one covers one's skin with it, with the cream." Places the spool with Group III.

Experiment II. While the groupings remain as arranged by the patient, the examiner asks: "Are there perhaps other possibilities of sorting the articles?" Patient shrugs her shoulders, does not know what examiner wants her to do. Examiner repeats his question with insistence. Thereupon the patient picks up the red-blue pencil, then the pencil sharpener and puts them together in a separate group. Thus she sorts together the small pencil and the eraser and likewise the fishknife and fork. She obviously does not succeed in making another arrangement. Examiner: "Why did you place the articles each in a definite group before, for instance, the sharpener, the pencil, the eraser?" Patient, pointing to the sharpener, says: "For sharpening the pencil." Examiner: "But why have you arranged this group only in this and not in another way?" Patient: "Because they belong together." Examiner: "What did you think when you made your sorting?" Patient: "Because they (pause) because they just belong together." Examiner: "But what reasons did you have for sorting this way? What does 'belong together' mean?" Patient: "One writes with the pencil, with this (sharpener) one sharpens it and with this, one erases and with this (letter opener) one opens the letters." Examiner: "And what are these all?" Patient: "Office articles." Examiner: "Did

you have this idea in mind during your sorting?" Patient: "No, only afterwards."

Experiment III. Examiner puts together in one group the *red* book, *red* ash tray, *red* pencil, and asks: "Can one also group these things together in this way?" Patient (pointing to the pencil): "For making marks in the book. The ash tray is for smoking." Examiner: "I could say something else about this way of sorting." Patient does not grasp what the examiner means (color). Examiner sorts the two *green* books and the *green* pencil sharpener together. Examiner: "Do you understand this grouping?" Patient denies this emphatically.

Examiner groups all *silver*-colored articles before the patient. She does not understand what this means, becomes quite apprehensive and asks whether she is very stupid. . . . Finally, in looking at the group, she says: "If there is a display in a show window then it does not matter what it is."

(Evidently patient means to say that there are show windows in which objects can be arranged in such "arbitrary" manner.)

Experiment IV. Examiner demonstrates to the patient a sorting of all articles according to *form*. He makes a group of *oblong* objects, of *round* and of *angular* objects. Patient persists in her way of sorting and tries to explain the groups from the context of use of the individual objects in each group. "These are books, and these are household articles, and these office articles—(pause)—but, no!" Patient realizes that the grouping of the articles is not intelligible in this way; however, she does not grasp the principle according to which they were sorted.

Experiment V. Examiner places before the patient the *red* book, in some distance from it—the *blue* cream jar and then hands the patient the red-blue pencil in such a fashion that its blue end points to the book, its red end to the jar. The patient should place the pencil there where it fits best. At first she is helpless. Hesitatingly she says: "To the book." Examiner: "Doesn't anything strike you here?" Examiner turns the pencil so that its red end points to the red book, its blue end to the blue jar. Patient, expressing surprise: "Oh, the color."

Experiment VI. Examiner asks patient to sort everything now "In this way." Patient: "According to the color?" Examiner: "Yes, as you did just now." Patient thereupon promptly forms the following groups:

- | | | |
|----------------------|-----------------|--------------------|
| 1. Red book | Red ash tray | Red-blue pencil |
| 2. Green pen holder | Green sharpener | Green travel guide |
| Green song pamphlet. | | |

3. Blue jar *near* group I and places the red-blue pencil with the fitting ends as a cross connection between these two groups, saying: "It should be cut in half."

4. All silver-colored objects.

Then patient takes the red pencil, holds it for a while close to the silver objects, but places it finally to the group I. Then she takes the black spool, hesitates for some time and puts it separately. In the same way she acts with regard to the glass prism and cannot be induced to sort it with any group, nor is she less helpless with the eraser. This also she wants to place separately. Examiner insists that she sort it with some group. Patient: "But it is *grey!*" (meaning the rubber). Examiner again suggests to sort it with one of the groups, whereupon patient finally decides for Group IV (on account of the silver-colored center). She reiterates that this does not suit her.

Experiment VII. Examiner restores the arrangement of all articles according to *form* (see experiment IV) and asks: "Is this a fit arrangement? Why can one also group in this way?" Patient, pointing to the oblong group: "They are all household articles." Examiner points out to her the letter opener in order to demonstrate that they are not all household articles. Patient is helpless.

Examiner again groups the *red* book, *red* pencil and *red* ash tray together (see Experiment III), asks whether this is the right way. Patient: "The book is for reading." Examiner: "Didn't you find another reason before?" Patient ponders for a long while, has to be encouraged frequently and eventually says: "Yes, I said that before, according to the color." Her entire behavior showed unmistakably that this principle had escaped her completely.

Examiner groups before the patient letter opener, pen holder, and *red*-blue pencil (oblong form). Patient: "These are office articles." Examiner puts *round* jar and *round* darning block together. Patient: "This is a stuff for beautifying and this is a thing for darning."

Examiner restores the red color group. The patient: "Because of the color." Examiner again places side by side the two groups of round and oblong objects. Patient: "These are two kinds of tools." Examiner adds the group of angular objects, gives the patient the knitting needle and asks: "To which group does it fit best?" The patient shrugs her shoulders, is lost. Examiner: "Didn't you sort before according to color? Perhaps you could do it still in an entirely different way, for instance, according to size or form or otherwise?" Patient: "The books are rather large and this:

(pencil sharpener)—not.” After looking for a long time, the patient suddenly expresses a sort of understanding. She can now also sort the knitting needle correctly, although quite hesitantly. The group of round articles she calls oval.

Experiment VIII. All objects are arranged in random fashion. Examiner says: “If you would have to sort all these objects into drawers, for instance, a round drawer, a long one, and a large square drawer, how would you place the objects together?” At first the patient disputes that there are any round drawers at all. Patient suggests she should imagine a round sewing basket. Thereupon the patient sorts as follows:

1. The books and after hesitating puts
2. All the oblong objects together and after a while also the separately lying red-blue pencil. She inquired once more about the form of the drawers and eventually adds the scissors to this group.
3. Pencil sharpener, glass jar, tape measure, eraser, darning top, ash tray.

Experiment IX. Examiner again assembles the red articles and asks the patient whether this arrangement is O.K. Patient, somewhat unwilling: “I have already said so, that’s a book, an ash tray, and a pencil for marking” (in the book). Examiner groups again the oblong articles. Patient: “That is a (pause), yes, perhaps one could place them each separately.”

Examiner places before the patient the green travel guide and some distance apart from it, the red ash tray. Gives her the red pencil that she should sort it where it belongs. Patient places the pencil with the ash tray: “Because of the color.”

Experiment X. Examiner makes 2 groupings. I. Metal ash tray, a metal medical hammer (the use of which is explained to the patient) and a metal pencil (like Eversharp).

II. Wooden pencil and a wooden blotter. The patient again calls out all attributes of use, but does not find the principle of classification material. Now the examiner explains to her that in the one group the objects are of metal, in the other wood. The patient says with a questioning intonation: “Oh?” This kind of sorting does not make sense to her. Examiner tries in vain to get the patient to find the superordinated concept “material,” for both groups. . . .

VOLITIONAL SHIFT AS CRITERION OF ABSTRACT SORTING ABILITY

The above protocols teach that a subject who lacks the abstract approach fails to respond consistently to the task of sorting according to material, form, color. Spontaneously, he cannot evolve such grouping. If, however,

he accepts, he cannot repeat this procedure under *varied* conditions or after an interval. That the patients "should have just forgotten" this principle, does not fit in with the other good memory performance during the same test (see, e.g., the comments of the patients on having repeated the same sorting or given the same answer before). We have no reason to posit such a memory defect nor can we relegate their "forgetting" to inattentiveness, distractibility, and plain "irrational" or "inconsistent" behavior.

The patients did not "forget" the principle of sorting, they never *grasped* it. Their conforming with the presented groupings took place on a concrete basis under specifically coercive conditions. Even the precise formulation of the task and verbal prompting on the part of the examiner did not enable the subjects to transcend the concrete level and "get" the concept. The presupposition that, to solve a problem, the subject must first understand it, is here "paradoxically reversed" as Hanfmann puts it so nicely: "In order to understand the problem the subject must be able to solve it" (27).

We have attempted to present some criteria of concreteness. All of these can be manifest in the normal as well as in the abnormal individual. They are criteria of pathological concreteness only in so far as the subject encounters unsurmountable difficulties in volitionally performing a shift either within the concrete realm or transcending from it to the conceptual. They are criteria only in so far as the subject cannot shift from these levels of concreteness to an abstract attitude towards the "conceptually possible." To determine this we have devised a special test procedure in our directions. They also permit the examiner to freely apply experimental variations from the standard procedure.

From our analysis it should be clear that it is the crucial objective of the test to elicit those sorting responses in the subject which are univocally independent of the described strictures of concrete realism. Therefore, the question of shifting must be the center of our experimental operation and analysis. We first have to consider the fact that the number of variegated spontaneous groupings as well as the number of accepted groupings is rather high in the normal. The abnormal usually will neither present nor accept the same amount of variegated groupings as the normal individual.

A small number of both eductive and accepted shifts in frame of reference during the course of the test is therefore some indicator of a rigid and more concrete procedure, and is suspicious of an impairment of abstract behavior. Yet, the low number of shifts alone is not a conclusive criterion of abnor-

mality, because here, as well, the final decision depends upon the substantiated information regarding the volitional or non-volitional rationale of the grouping in each performance. For example, we may observe a small number of shifts, because the subject has evolved the sorting according to class concepts, e.g., metal, wood, color, etc., and offers good logical reasons for not adopting additional points of view for grouping. His thinking may be of such abstract nature that sorting according to various possible concrete situations does not appeal to him. On the other hand we may observe a great number of variegated sortings, but the subject produces them on an exclusively concrete situational basis. He may even evince an abnormal lability in grouping, because he is influenced by the varying situational valences of the articles. The number of his shifts does not indicate whether or not they took place on a *voluntary* concrete basis. It also fails to inform us directly whether the subject was simply not disposed to sort according to class concepts or actually suffers from an impairment.

From these two extreme cases it may be evident that the number of shifts, *per se*, cannot offer a basis for judging behavior in the test symptomatically normal or abnormal. The criterion which should be employed in this test is to be found in one specific kind of shift. This is the shift from the concrete approach to the abstract-volitional. The main concern of the examiner must be to ascertain whether the subject is capable of this shift or not; whether the subject's sorting is *forcibly* restricted to concrete contents alone, or can include any abstract principle. Only for this is it an integral part of the experimental procedure to study the *number* of shifting potentialities of the subject with regard to the *nature* of these shifts.

DIRECTIONS

First the objects are placed in a definite order which appears as a random order to the subject. It is advisable to use a checkered oil cloth, so that every article has its definite place in one of the squares.

Before the subject is asked to sort the articles, he has to identify them, to make sure that they are familiar to him. Unknown objects are explained. Defective color vision is to be ruled out. In all experiments a record is kept of the instructions given, the subject's procedure, and sequence of the objects selected; all his answers, questions and spontaneous comments should be reported verbatim.

Throughout the test, whenever the subject should ask whether his performance is correct or not, he should be reassured that there is no correct or incorrect response, but that every person has a different way of putting

the things together—or that the examiner just wants to see the way the subject puts the things together.

Experiment I. Handing over.

a. Examiner instructs subject: "Select any one of the objects you like and give it to me" (object of departure).

Examiner then says: "Give me all objects that you think can be grouped with this one."

If subject does not seem to understand, examiner says: "Give me all objects that you think belong together with this one," or, "What belongs together with this?"

Each article handed to the examiner is removed from the subject's view. Prompting should only take place if subject selects less than two more objects. When subject indicates that no more objects can be grouped with the initial object, his sorting procedure is considered ended.

Now the examiner presents the selected articles to subjects and asks: "Why do they all belong together?" or, "Why did you group them together?" or, "Why did you put them together?"

If subject proceeds to name the chosen articles in turn rather than to give the basis of their all belonging together, the examiner may say: "But in what way do they all belong together?" or, "But in what way are they all alike?"

From the groups formed by the subject and his verbal responses it should be tentatively determined whether or not the subject has sorted concretely and if so, whether predominantly or exclusively.

b. After completion of the first experiment, the examiner himself selects the initial object. Presenting it to the subject, he instructs the subject, as in Experiment Ia ("Give me all objects that you think can be grouped with this one, etc."), and continues with the same procedure as in Ia.

This experiment has to be continued by varying the initial object chosen. The examiner's selection of objects should serve the purpose of eliciting abstract groupings from the subject in case the subject had preferred concrete groupings. For instance, the examiner selects the red disk with which it is hard to group concretely. Other suitable objects of departure are: bicycle bell, rubber ball, white candle, chocolate cigar, cracker.

The sortings made by the subject have to be sufficient in number to warrant an estimate whether or not the subject sorts concretely, and if so, whether predominantly or exclusively.

Experiment II. Sorting.

Examiner reestablishes the original random order and says: "You see these objects lying on the table. I would like you to make order out of this hodge-podge. Place those objects that you think can be brought together into separate groups; but sort *all* articles!"

If subject does not seem to understand, examiner repeats instruction, modifying the two last sentences: "Put those objects together into separate groups that you think belong together," or "Make groups of those articles that belong together."

Examiner prompts and encourages the subject to accomplish a grouping that will leave no object unsorted. After subject has finished his sorting or indicates that he cannot group any more objects, examiner asks: "Why did you group them in this way, why did you put them together in this way?" or "Why do they all belong together?" (pointing to each group).

If subject should attempt to use objects from a group that has already been established for another group, examiner should ask the above question, before the established group is destroyed. Using objects from established groups for forming new ones should, however, be forbidden as long as subject has not explicitly exhausted his trials to form groups of *all* the given articles.

From these groups and the subject's verbal responses the examiner should tentatively determine whether or not the subject has sorted concretely and if so, whether predominantly or exclusively.

Experiment III. Shifting.

a. After the subject's reasons for his own groupings have been determined as far as possible, examiner says: "Are there perhaps other possibilities of grouping the articles?" or, "Can you sort the articles in a different way?" or, "Make other groups of the articles," etc.

If the subject denies any other sorting possibility, and in spite of prompting, refuses to sort differently, one may conclude that subject is unable to shift volitionally and is therefore abnormally concrete.

b. If the subject complies, the same directions are followed as under II a, regarding procedure and inquiry. After completion the examiner repeats the experiment, instructing the subject again to sort according to still other possibilities, etc. This procedure is continued until subject has exhausted his sorting attempts. From subject's groupings and verbal responses the examiner determines: whether the subject's sorting is *confined* to a concrete basis of pertinence or whether the subject has given sufficient evidence that

he is able to shift volitionally and according to abstract frames of reference. It is noteworthy that normal subjects easily tend to discontinue rearranging the experimental objects and spontaneously begin to enumerate other sorting possibilities *verbally*. In this case the subject deals rather with the *names of the articles in a categorical sense* than manipulates with them existentially. If he thereby evolves true class concepts, this fact strongly suggests that the subject was able to adopt an "attitude toward the conceptually possible" and therefore sorts in the abstract, independent from the real nature of the objects. This, of course, facilitates the examiner's task and he can expedite matters by continuing to probe the subject's abstractive ability verbally. Here it is advisable to have the subject form hierachic class concepts of the objects, e.g., toy tools, real tools=tools; toy eating utensils, real eating utensile=eating utensils; tools, eating utensils=metals, etc.

Experiment IV. Coercive Conditions of Sorting.

a. In spite of being prompted the subject may either reject any other grouping possibility or show paucity of shifting to the extent that is suspect of rigid concreteness. In both cases the examiner *himself* presents to subject new groups. After *removal of all articles* from the subject's view, the examiner presents such groups which the subject has not yet formed and which represent "categories" or "classes" from a conceptual point of view; e.g., the following classes of objects are placed one after the other before subject: all metal, all round, all red, all oblong, all double occurrences, all toys (including toy dog), all brown, etc. Each time the examiner asks: "Do these objects belong together?" If subject fails to understand their belongingness, he should be prompted by saying: "Isn't there any way in which they could belong together?" or "Isn't there any way in which they are alike?" If subject answers in the affirmative, examiner asks: "Why do these objects belong together?" or, "Why can they be grouped together in that way?"

b. There are five possible responses.

1. Subject accepts the group on the basis of a genuine class concept or generalization.

It has to be ascertained whether subject's responses are in concordance with his performances in Experiments I-III; if not, his response in Experiment IV should be scored doubtful.

2. Subject rejects the belonging together of the articles in any sense—spontaneously or upon inquiry. This response should be scored as abnormally concrete, but for safety is to be corroborated with the performances in Experiments I-III.

3. Subject accepts the groups, but spontaneously or, upon inquiry, gives reasons, which have not the demanded categorical nature of a class concept; instead they are definitely concrete (situational, etc.). Subject should be urged to find out whether there is not another way in which the articles belong together or are alike. If subject persists in his non-abstract response, the performance should be scored abnormally concrete, but also corroborated with the performance in Experiments I-III.

4. Subject complies with the suggestion of the experimenter that the articles are alike in some way, etc., but he cannot offer a reason other than to comply (*e.g.*, to please the examiner). This response is scored doubtful.

5. The subject accepts the group, but offers such "abstract" reasons which either contradict his performances in Experiments I-III or are doubtful as to their genuine abstract reference, or both.

Experiment V. Control Experiments.

The following experimental variations are indicated in any case of a doubtful response in Experiment IV. It is, of course, difficult to exhaust in these instructions all possible criteria for a doubtful response. A well-trained observer will be less uncertain than one who has no experience in the application of the test and with patients. Therefore it is advisable to administer the experimental variations in most of the cases.

One ambiguity, however, is to be pointed out in principle: the ambiguity of verbalization, which contains potential pitfalls, especially for evaluating the verbal responses in Experiment IV.

It may happen that a subject has accepted the groups and accounted for them by saying, "They are all red," or "long," or "metal," or "toys," or "round," or "They all have the same shape," or "same material." The examiner should be cautioned against concluding prematurely that this verbalization is a univocal proof of an abstract approach, especially in the case where the use of these seemingly abstract terms contrasts with concrete performances in Experiments I-III. The subject may have uttered the words without actually having meant them as names for class concepts. He used them only as description of his concrete palpable experience of the shift in phenomenal organization or situational context, in which the articles cohered for him under the more forcible experimental conditions in Experiment IV. Therefore, the subject's acceptance and verbalization may just as well be an expression of his concrete experience of sensory cohesion with regard to, *e.g.*, all long or all red articles, etc. This reservation is especially called for in the case where the subject's performance was symptomatically concrete on the preceding part of the test so that his

behavior in Experiment IV appears to be inconsistent. Therefore it is important to corroborate the subject's responses in Experiment IV with those in Experiments I-III. For example, has the subject used the categorical principle of color, form, etc., in his previous choices, or not?

In order to ascertain whether subject has accepted the experimenter's grouping on a *conceptual* basis, the examiner performs the following control experiments:

1. Establish the original order and ask subject: "Group the objects according to the principle of (a) size, and subsequently (b) form, (c) color, (d) material," etc. Naming of the specific color-name or name of the material should be avoided. This experiment is to be continued until it is clear whether subject has sorted according to a principle and can account for the principle verbally.

2. Establish the original order and ask subject to sort the articles into two groups, one according to "material," the other one according to "color," etc. After subject has completed the grouping, ask: "How did you do that?" or, "Why did you group this way?" Prod subject on to formulate the principle of his sorting.

3. If there is any difficulty in subject's understanding the instructions of experiments 1 and 2, the experiment may be varied as follows: Present two groups, one according to color, the other according to material, and ask: "Does this kind of arrangement make any sense to you?"

If patient answers in the affirmative, ask: "Why?" Establish whether his reason for acceptance is due to a conceptual reference or to an unreflective apprehension of the two groups, as two experiential wholes on a sensory basis. If this question needs further clarification, destroy the presented order and ask subject to sort the articles according to (1) the two principles of color and material, (2) two other principles which you think are appropriate (*e.g.*, size and form). Vary the groups as follows: (a) remove consecutively several objects from either group and ask the subject each time whether "this makes any difference" to him, whether the group still "makes sense." Such changes do not of course affect the normal subject's class concept but do easily upset the concrete "togetherness" or belongingness within the respective groups as the abnormal subject experiences it.

4. Reestablish the original order and ask subject to sort the articles into three groups, two according to different forms (round, oblong, but do not name) and the third according to use, or any other class in which the articles partially overlap with the characteristics of shape.

This experiment can be varied in any desired way. Its purpose is to

confront the subject with a task of sorting, in which he has to hold in mind *at least two different principles simultaneously* (shape and any kind of use). At the same time he must make a decision, wherever the article, for instance, the chocolate cigar, could be placed with either group, i.e., with that of oblong or that of edibles, etc.

Patients of the characterized type will encounter the greatest difficulty and manifest extreme discomfort at such "crucial" decisions, or they can not follow the instructions at all. In the latter case the examiner should demonstrate the three groupings to the subject and ask: (1) whether those arrangements make any sense to him and why or why not; (2) to repeat these arrangements after the examiner has established the original order and another task has been interpolated.

EVALUATION

a. These instructions and the control experiments given under V may offer the examiner leads as to how he can vary the experimental arrangement in cases of doubt.

They are to be understood as samples of possible experimental variations, all of which have the same objective in common. This objective is to ascertain whether the subject is able to volitionally assume the abstract approach and to account for his action as a sorting according to a conceptually established point of view. It should be kept in mind that in general a normal subject is well capable of grasping sorting principles of a higher conceptual order or of evolving such principles himself. In contra-distinction to the patient, the normal person, even if he does not catch on immediately, is able to shift to the demanded abstract attitude with but slight inducements or hints on the part of the examiner. Therefore, the examiner should scrutinize the entire behavior carefully during each subtest with due regard to the following symptoms: minuteness and pedantry, slowness, hesitancy, lack of self-assurance, incessant questioning, gesticulation, etc. All these symptoms taken as a whole behavioral syndrome, either as to their absence or to their presence are extremely valuable for the examiner in cases where further control experiments are indicated.

After the examiner has administered the test according to the standard procedure here elaborated under I-V he should feel free to adapt the experimental arrangement for the needs of the individual case. For this he may consult the sample protocols by Weigl and Rothmann, especially the experiments in threes and under coercive conditions.

b. In cases where the subject's response has been scored lacking in

abstraction because he has rejected or unsatisfactorily responded to the groups in Experiment IV, it may be of interest to investigate his concreteness. For this purpose the subject may be presented again with the groups of Experiment IV with the following modification: Each group is presented not alone, but together with the rest of the articles as a separate heap. For example, all red articles in one heap and the other objects apart from it. This arrangement is conducive to being experienced as a contrast phenomenon in the perceptual field: red against miscellaneous objects. The examiner asks again: "Does this arrangement make sense to you? Can these articles be grouped together in this way? Why?" or "Why not?" Because of the phenomenon of induced contrast the subject may accept on the basis of sensory cohesion, although in the presentation of Experiment IV without such contrast, he has not accepted the group. In case subject still rejects the group, it is to be concluded that his concreteness is of a more rigid type than if he had been able to shift sensorially. In case that subject has accepted the coherence, it may be further investigated as follows:

After an interposed interval the subject may then be again presented with arrangement of Experiment IV (the group *not* in contrast with the other articles, but alone). Preferably, however, one should use other than the experimental objects, other red colored, oblong, round, etc., articles and less in number. Subject is again asked whether this arrangement makes sense to him, etc. In many cases the subject will now deny that, and will not have learned from the former presentation.

c. Regarding application of this test, the following results of previous investigations are noteworthy: children of the chronological age of 8 and 9 have shown ability to classify the objects from various points of view, *i.e.*, to shift, and were also able to derive the basic similarities between objects placed together by the examiner as well as to disregard the differences in other attributes. Brain-injured and some types of schizophrenics could not shift from one type of belongingness to an abstract-classification voluntarily; nor could they give the basis of similarity between objects placed together by the examiner. Their basis of pertinence of sorting was to the largest percentage in terms of use in a specific situation, whereas responses to similarity of color, material, or form were almost completely absent. Both groups showed a decisive preference for pairs.

The test, therefore, should be suitable for determining impairment of abstract attitude in cases of mental deficiency due to abnormal development, brain lesions, and schizophrenia.

THE WEIGL-GOLDSTEIN-SCHEERER COLOR FORM SORTING TEST³⁸

DESCRIPTION OF TEST

The purpose of this test is to determine whether the subject is able to sort a given variety of differently colored figures according to the categories of color or form. The twelve figures, arranged in random order, consist of four equilateral triangles, four squares, four circles. In each set of four equally shaped figures one figure is red, one green, one yellow, one blue. The reverse sides of all figures are white. The sorting task involves also a definite shifting from the one principle of order to the other, because the subject is first told to "sort" the figures which belong together without specification; after he has grouped them, either according to color or form, he is then asked to sort them again "in a different way." Hence the subject has volitionally to shift his point of view. For example, if the subject has first sorted according to color, he now has to find another principle of sorting, that of form. When, in the latter case, the examiner's instruction "to sort differently" cannot induce such a shift to take place volitionally on the part of the subject, the figures are arranged in such a fashion that sorting according to form and not color is strongly suggested by the arrangement itself: the figures are turned with their white sides up, so that color grouping can no longer take place. Apart from special control experiments which will be discussed later, an important experimental variation of the test is the use of four times the number of figures so that there are 4 circles, 4 triangles, 4 squares of red and likewise of green, yellow and blue (48 figures).

BEHAVIORAL ANALYSIS

The Two Approaches

Numerous experiments³⁹ with normals and subsequent interrogations have shown that there are two approaches open to the normal subject.

I. Abstract. The subject assumes a conceptual attitude from the very start. He carries out the instruction by volitionally abstracting from the various individual sense impressions and orients himself toward a con-

³⁸ The first test of this kind was published by Weigl, *I.c.* The following experimental analyses and directions have been elaborated on the basis of investigations by Goldstein and Scheerer.

³⁹ Weigl, Goldstein, Scheerer, Bolles.

ceptual frame of reference, the category of form or of color. To elaborate: the subject transcends the immediate experience of each figure as *one given thing*; he disregards this thing-like character which comprises shape and coloration in *one* and segregates the two properties, shape and coloration, from each other. He consciously generalizes the so-segregated sensory properties of each figure according to form and color hue and systematizes them into a principle of classification. He subsumes the various figures under a particular class concept, taking the single figure as a representative of a category; that of form or that of color hue. Among others this procedure is frequently manifested by the subject's questions during such behavior: "Shall I sort according to form or according to color?"—and by the subject's ability to give account of his sorting procedure, of its conceptual basis, to himself and to others.

In arranging the material spatially, the subject will casually "throw" the forms he chooses in different heaps or piles, not being particular about the spatial position of the individual figure within each heap.

He will either form four piles of equally *colored* figures, corresponding to the number of color hues present; or he will form three piles of equally *shaped* figures according to the number of shapes present. He does so because he can treat the single figures *collectively* as falling under the category of color with the subclassification of green, yellow, blue, red—or under the category of shape with the subclassification of triangular, square, circular.

II. Concrete.⁴⁰ The subject unreflectively surrenders to the experience of the various figures as individual "things." Yet these "things" are no objects of real palpable usage. The only tangible properties they have consist of "*colored*" shape or "*shaped*" color. Therefore the subject is delivered to the sense impressions as they arise from the properties of the given material. These properties of shape and color *belong* to the given figure as an undivided whole, and do not particularly gravitate in themselves towards favoring the color aspect or the shape aspect. Therefore the subject's immediate apprehension will be guided by either one of the two following impressions: (1) That of a motley variety. In glancing over this color variety, one particular color is easily thrust phenomenally into the foreground (be it the red, the blue, the green, the yellow). Thereby the like colored objects tend to join together in uniform "color spots." (2) Or the subject's impression is that of a variety of shapes. In glancing over this shape variety, easily one particular shape element is thrust experientially into

⁴⁰ In normals this attitude may be experimentally induced by instructing them to sort the figures rapidly without deliberate reflection.

the foreground (be it the circle, the triangle, the square). Thereby the congruently shaped objects tend to stand out as belonging together. Which one of the two impressions, the *color* congruency or the *form* congruency obtrudes phenomenally depends upon the present personality make-up and background of the subject.

In either case the described sensory organization occurs as an unreflective response. The material is apprehended in the mere perceptual realm of phenomenal immediacy—be it that the color aspect is accentuated or that the shape aspect is accentuated. Essentially, the subject's experience of this aspect as a sensory belongingness of like colored objects or of congruently shaped objects is the effect of two factors: of the instruction "to sort those which belong together" and of the subject's present attitude of passive surrender to the organization of his sense impressions. (This entire description can be easily matched by observation in daily life. If one looks passively at certain colored patterns such as mosaics or tile floors, one experiences a predominance either of like colors or like shapes without any conscious effort.)

When the S. begins to arrange the figures in space, he may well follow what is for him the dominating sense impression of color or of shape and place together those figures which, to him, belong together sensorially. Yet, he does not throw them casually in a heap. He usually arranges these figures in a definite spatial order as for example:

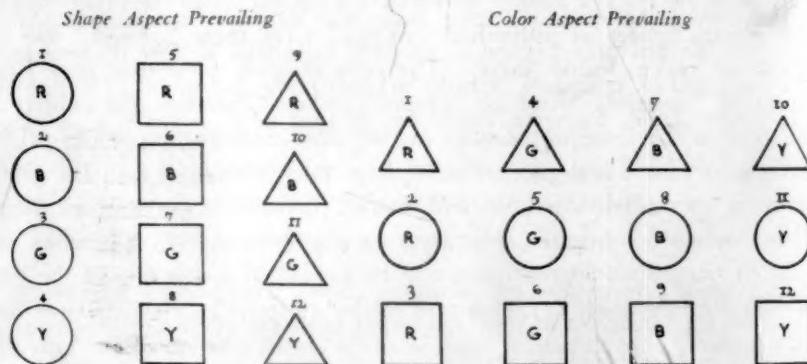


FIG. 12-A

FIG. 12-B

The numbers represent sequence of placement.

Why? In the concrete attitude the subject cannot break asunder the unity of the given thing and hold apart systematically its properties—in this instance shape and color.

Hence, the subject never actually separates in his grouping the prevalent color—or shape aspect—from the given figures, in an abstract sense. He does not deliberately single out that prevalent aspect as a common denominator so that he can deposit the figures heapwise from a collective point of view. His spatial arrangement of the figures cannot be arbitrary. Even though the subject follows one prevalent impression, e.g., that of shape, his placement of the figures still remains under the influence of his taking them as individual "things"! Thus he fits the differently colored, congruent *shapes* so that the colors, too, fit a definite pattern and, in the case of prevalent color aspect, he fits the differently shaped *colors* so that the shapes, too, fit a definite pattern.

Of course, this description is by far too "rational" and rather a circumscription of the underlying psychological process due to which the subject deals with the figures as undivided wholes. This fact had to be stressed, because to the untrained observer such a meticulous grouping could appear to be a highly conceptual, well thought out, spatial order. How this can be disproved by control experiments on shifting and why the concrete subject prefers certain types of spatial arrangement will be discussed later. Under certain rather rare circumstances a subject sorts on a concrete basis, but does not arrange the figures in the described way. In that case one can easily ascertain whether the subject did or can sort abstractly, by asking him to sort "in a different way."

Every normal is capable of assuming both the abstract and the concrete attitude. Hence he will be able to shift in his grouping from the concrete approach to the conceptual, in case he made his first grouping on the basis of a concrete response. Likewise will he be able to shift in his sorting from color to form and *vice versa*. Without difficulty will he, for example, shift his sorting to form when he first groups according to color and is asked to sort differently. At the same time the normal can give an account of the basis of pertinence in his grouping. He is able to verbalize the principle even in the instance where he made his first arrangement on a more concrete basis.

Individuals with disturbance of cortical function are unable to assume the abstract approach and therefore discharge the task on an exclusively concrete level of responding. Since their concrete reaction lacks the control of conceptual thinking, their performance shows an *abnormal concreteness* which expresses itself in various symptoms. The patient cannot abstract color or form as a principle of sorting. He shows a preference for one way of grouping the figures. He is unable to *shift volitionally* from his way of

grouping to another way. In so far as shifting occurs, it occurs *passively under forcible* experimental conditions. Thus, grouping according to shape may be induced by presenting the figures white side up, but the patient does not benefit by this inducement for subsequent volitional abstraction or shifts under other experimental conditions.

It is with these behavior symptoms of abnormal concreteness that the examiner has to familiarize himself in order to evaluate correctly the performance of the testee and to apply the test appropriately.

Characteristics of Abnormal Concreteness

In the following we will enumerate the chief characteristics of the abnormally-concrete reactions of patients to the various tasks in this test. We shall thereafter elaborate and illustrate each mentioned point by protocols.

I. *The Patients Show an Abnormal Tendency to Build Patterns.* The material does not consist of objects which belong to actual life situations. It is not close to reality. For the normal and all the more for the characterized type of patients the objects are more or less "foreign" in nature. If the objects were not lacking the character of living reality, but were palpable material of daily routine, then the patient could deal with them in a practical way. He would, for example, bring them together according to use,⁴¹ or other situational functions. Since this concrete response is not open to the patient in the presence of our material, he encounters difficulties in coming to terms with the task of grouping such rather "unreal" things. Abstractly he cannot single out their common properties; hence the only means of responding which is available to him is to deal with the figures concretely *by doing something with them* in a tangible way.⁴² He tries to cope with the task by arranging the figures in a pattern where they function as "things," and not as senseless figures, where placement would be irrelevant. He tries to build a pattern of things which has a configurational sense for him. As previously pointed out, the concretely responding subject will follow one of the two sensory impressions, which become dominant for him while he glances over the material: that of coloration or that of shape. Therefore the patient will arrange a pattern in which this dominant impression is spatially realized, *i.e.*, he puts together figures of like colors or like shapes; but at the same time the "thing" character of the individual

⁴¹ See discussion of G.G.W.S. Object Sorting Test, page 87.

⁴² Cf. the behavior of patients in G.G. Color Sorting Test, where they pick out skein "for a jumper," page 71.

figures remains alive. He builds a pattern of an ornamental or other kind of spatial organization with a definite structure.

II. The Pattern is Not Arbitrary, but Follows definite Structural Laws. It should be emphasized that there is no evidence to support the assumption that the patient first preconceives a scheme of spatial arrangement and then translates this plan into action. Rather the opposite seems to be indicated. The patient solves the problem of sorting by *doing*. In this process of "doing" which is guided by the dominant sense impression, the patient becomes subjected to the configurational valences as they arise from the figures placed, and from their perceptual interfluence so that the pattern emerges during and by virtue of the activity of placing one figure after the other.⁴³

The spatial arrangement of the figures does not depend upon the color likeness or shape likeness as such—because the latter is not abstractly singled out. The pattern may be determined by Gestalt laws, such as balance, symmetry, closure, etc.

Let us illustrate an arrangement which follows a very simple law of spatial organization and which is determined by the configuration the patient has formed in placing the figures of one color: He first groups the red figures (1, 2, 3) and repeats the identical configuration for the blue, green, and yellow figures. (Fig. 13.)

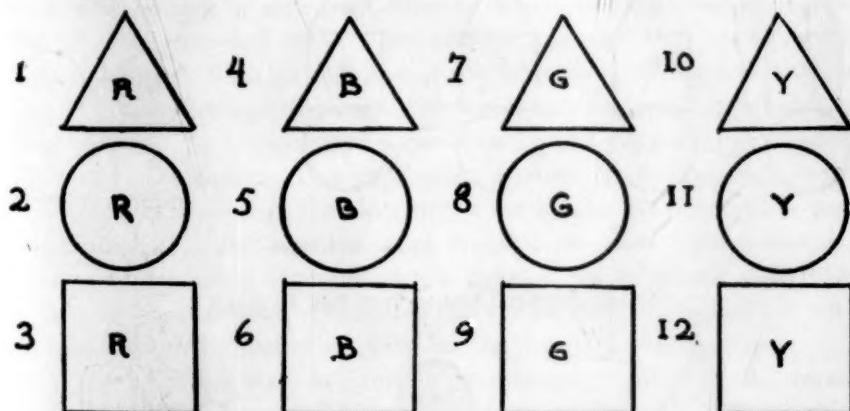


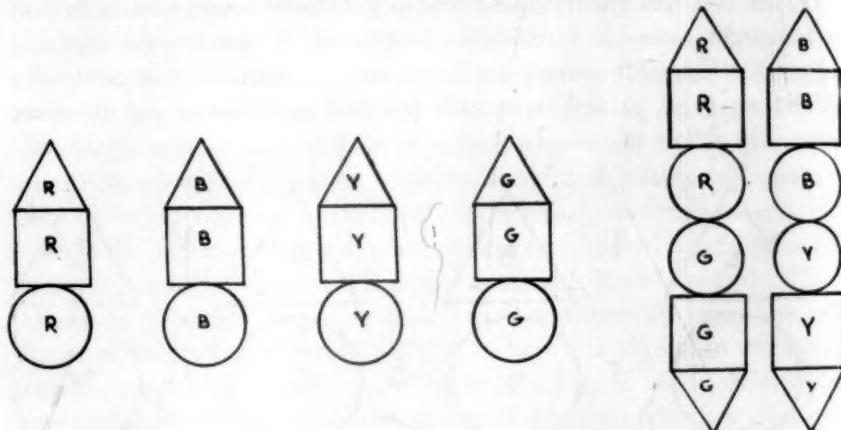
FIG. 13

This spatial arrangement may be determined also by the arousal of previous experience as in the case of the Balinese, who frequently arrange

⁴³ Similar factors have been pointed out in the Analysis of Behavior of Patients on the cube test, page 41 f. of this publication.

the colors according to their tradition of geographical and religious orientation in space.⁴⁴ The aforementioned Gestalt tendencies manifest themselves still more articulately in experiments where the number of figures used is augmented 4 times (e.g., 4 circles, 4 squares, 4 triangles of each color). Whereas the 12 figure set has a limited amount of possibilities for a patterning of an ornamental or design nature, the 48 figure set offers more and freer possibilities for following Gestalt tendencies towards balance symmetry and closure and for realizing corresponding ornamental traits (Figure 14). Yet in the 48 figure set the normal subject hastens to discharge the task of sorting so many figures by particularly neglecting the placement of the *individual* figure. His piles or heaps are perfectly unorganized and irregular. The patient, however, takes painstaking care of arranging the figures in a specific pattern. Obviously he does not chance upon the more expedient alternative of throwing the like figures in a heap.

FIG. 14
COLOR ASPECT DOMINATING THE PATTERN



SHAPE ASPECT DOMINATING THE PATTERN

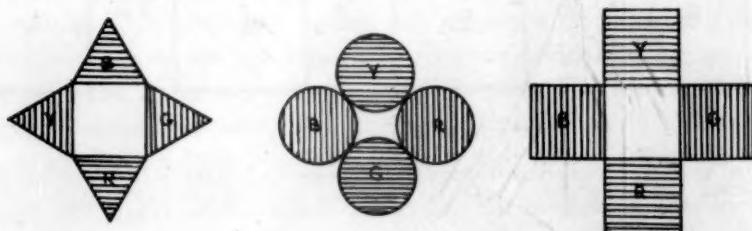


FIG. 14

⁴⁴ Cf. Jane Belo's report on investigations carried out in Bali with the G.G. Color Sorting, the G.G.W.S. Object Sorting, the W.G.S. Color-Form Sorting Test (in press).

Indeed, the patient is greatly disturbed, if not unable to continue, if the examiner interferes with his pattern building or removes each newly selected figure from his view. The reasons are obviously similar in nature to the behavior of patients on the G. G. Color Sorting Test, where they cannot continue in their pseudo-series if the examiner removes the last-chosen skeins.⁴⁵ The quantitative increase of figures can easily serve as a crucial experiment of qualitative diagnostic value: Wherever there may be doubt as to whether or not the subject patterns the 12 figures on an involuntary, concrete basis, the same experiment with 48 figures should clarify the situation by a fair measure. The instruction then added is to "Do it as fast as possible."

It stands to reason that a normal who may prefer patterning of 12 figures because of esthetic leanings will not follow the same procedure with 48 figures—especially if told to perform his sorting as quickly as possible.

The subject who *persists* in a pattern arrangement under these circumstances has to be considered abnormally concrete—unless other control experiments should bring about results which justify this behavior as a volitional action.

III. The Patient Cannot Abstract Color or Form as a Conceptual Principle of Sorting. He Cannot Account for His Grouping. He Does not Grasp what Sorting Means. In view of the described tendency in patients to build patterns, an untrained observer may suspect that this behavior is of a higher order and involves more complex activity, than a sorting into irregular piles. Such an interpretation is refuted by the facts cited; it is, however, methodologically illustrative of a fallacy frequently committed by investigators. In evaluating concrete behavior one reasons on the basis of a wrong psychology. This psychology assumes by quantitative, merely overt behavioral criteria, that an action is the simpler the less units or parts it contains, and that it is the more complex, the more parts it contains. From the numerous examples of this point in the behavioral analyses of our tests, the conclusion is indicated that the measure of simplicity is not a smaller or greater number of parts, but the degree of concreteness.⁴⁶

If the patterning were to signify a more complex type of mental organization, then the patient should be able to formulate the reason for his action and to abstract the principle of color or form—at least if that is demanded of him by the examiner.

Let us follow a part of Weigl's protocol on patient R.

Experiment I. Pt. puts together a red triangle, a red circle, and a red

⁴⁵ See page 65 of this publication.

⁴⁶ See the examples of the House copying in the Stick Test, page 136 f., for pseudo-series in the Color Sorting Test, page 63 f.

square, in a vertical row. Then he puts together the blue, green, and yellow figures, so that as a result a series of vertical rows, one red, one blue, one green, one yellow lie next to each other about an inch apart.

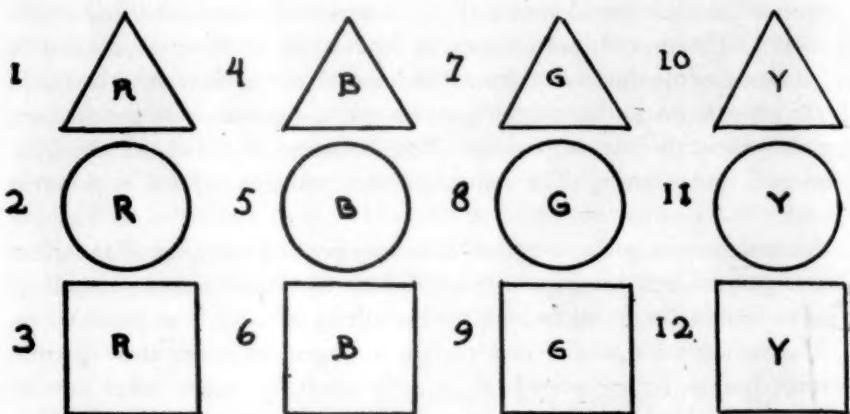


FIG. 13

The patient built. His procedure was obviously determined by the color. Yet, he did not form four different irregular piles of color but first laid out a pattern of red figures, and then *copied* this in the other colors. The patient can give no explanation concerning the point of view according to which he undertook the arrangement.

When told to sort the figures "differently," the patient proceeds in the following manner: "After long consideration he *exchanges* the circles and triangles within the rows of like color. This shows that the patient is strongly confined to a very definite impression, *viz.*, that of color, from which he cannot free himself deliberately. Further, he is not at all capable of reflecting upon his method of procedure. These facts strongly indicate that he did not put the figures of like color together because he started from a conceptually evolved principle of sorting, but rather that his reaction was forced upon him by the sensorially-suggested aspects of the situation. It would be, of course, erroneous to assume that the patient "sorted" in considering color and form simultaneously, because of his spatial arrangement. That this is not the case, but that the patient is, rather, unable to abstract form or color deliberately is borne out by the subsequent experiment.

Experiment II. In order to attain in the patient an orientation toward form, the experimenter presented the figures to him again unarranged and

repeated the instruction to sort them "differently." After about five minutes the patient decided on this arrangement:



FIG. 15

He supported it by pointing to each circle and saying: "All different" (whereby he wanted to indicate the difference in the colors). The patient answered *in the affirmative* to the experimenter's question as to whether one could also have arranged the figures thus (substituting a yellow triangle for the yellow circle):



FIG. 16

From this experiment we see how careful one must be in judging overt results. Although at the beginning it seemed certain that the patient had finally "arrived at the form," this supposition was proved false by his reference to the different colors of the circles. He obviously wanted to proceed "quite differently" from the way he did in the preceding experiment; but he remained nevertheless oriented towards color impression. Whereas at

first his procedure had been determined by the similar colors, now he is reacting ("quite differently") to the different colors. The similarity of form in the circles played a decidedly secondary rôle. This is proved by the fact that he accepted the examiner's replacing the yellow circle by a yellow triangle.

Experiment III. The experimenter himself arranged the figures in the two following configurations:

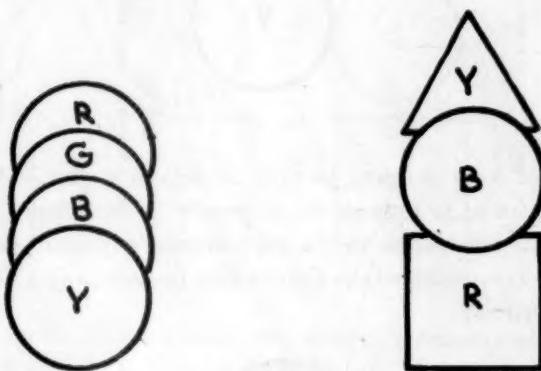


FIG. 17

He asked the patient "which arrangement is prettier?" The patient replied, "I think that one" (pointing to the circles). Examiner: "Why?" Patient (after long consideration): "Because they are all this way" (making circular motions with his finger).

Not until the two rows were placed beside each other was the patient thereby enabled to react to the element of form. And even this shift did not take place in the conceptual sphere but remained within the palpable phenomenal realm—"because they are all this way" (makes circular motions). It is extremely characteristic for the patient's behavior that this transition is so difficult for him. The circumstances must be absolutely "coercive" in order to bring about the *phenomenal* shift from color to form."

The same facts are evidenced in the following protocol by Scheerer.

The female patient, W., was given the 48 figure set. When told to sort those which she thinks belong together, she groups the *red* figures together. The patient thereby forms the following arrangement:

ALL RED

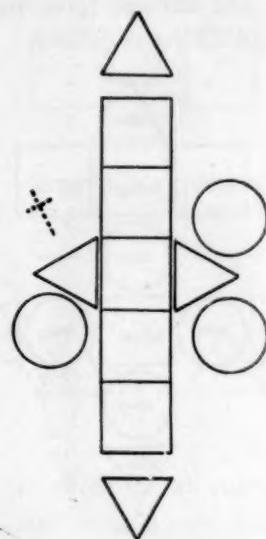


FIG. 18

Accidentally the fourth red circle was missing (had fallen under the table). The patient, pointing to the left corner (see broken cross) said: "I have no more coloring," and spontaneously changed her arrangement thus:

ALL RED

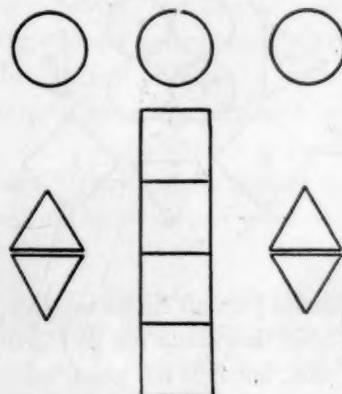


FIG. 19

Question: "What have you done?" Answer: "What you told me to." Q.: "How have you grouped them, how do they belong together?" A.: "I grouped together this one and this one (pointing), my color is this one." Then she arranged all yellow figures as follows:

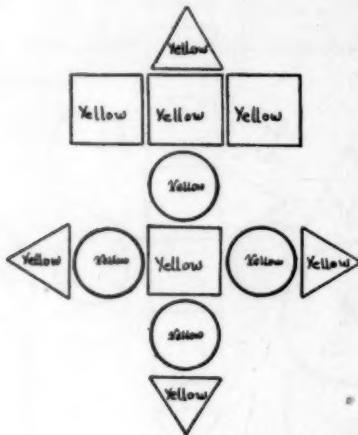


FIG. 20

The examiner repeats the instruction by changing the wording and stresses that the patient should use *all* figures to group those, which she thought belong together. The patient exclaims: "Oh, mix the colors?" and produces the following arrangement:

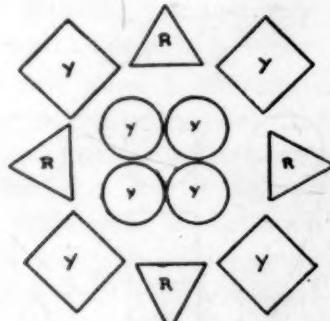


FIG. 21

Now the examiner himself puts all circles together, asking: "Could they all go together?" A.: "No, they could not go together, too much coloring. Sometimes you can do that, but it is not good, too much coloring."

Examiner turns all figures with their white sides up. Patient: "Now

it's all right, now it's different," and saying "it's easy," she starts to group the figures meticulously in the following way and order:

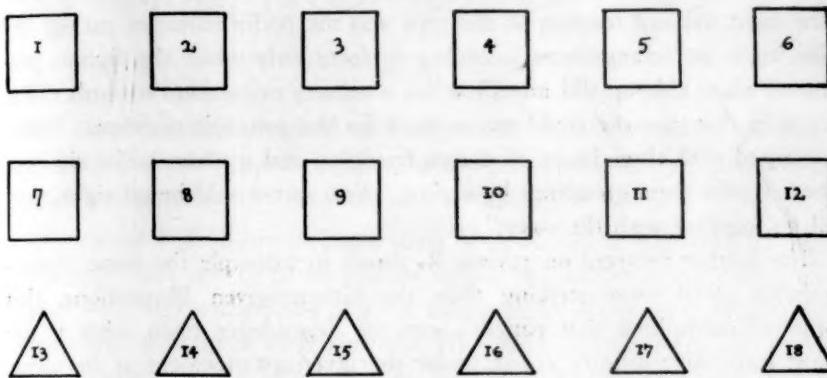


FIG. 22

Examiner brings together all circles, all triangles, and all squares, each kind in one random heap, and asks: "Could they go together?" A.: "Yes, that would be all right, they all go together with the color." Examiner tries to explain the likeness of shape within each of the three heaps, but the patient remains uncertain when asked to group according to "shape" or "form." "I don't know what you mean." Examiner turns the figures again with the colored sides up and instructs the patient to group those which belong together. The patient again sorts the figures according to color in *definite* spatial arrangements as she did before. This time also she cannot be induced to bring together or to *acknowledge* groupings according to form.

Among other factors we should first like to point out the following in the above protocols. The patients cannot abstract volitionally form or color. They do not grasp what likeness of shape or color *means* in the abstract even if they should accept a grouping presented by the examiner on that basis. In the extreme case, as in the instance of patient W., they even reject such presented groupings. They cannot account for their own grouping in a conceptual way and therefore do not grasp the quintessence of what sorting means.

IV. *The Patient's Grouping Depends Upon the Sensory Aspect by which He Is Dominated. He Cannot Shift Volitionally from that Impression to Another. Shifting, if at all, Is Passively Induced by "Coercive" Experimental Conditions.* The quoted protocols teach us that the patients could

not achieve a shift from their first impression of color to that of form by volition.⁴⁷ Any shift that took place was obtained only if the examiner arranged the presentation of the figures in a particular, suggestive way. The most striking reaction of this type was the performance of patient W. She made an arrangement according to form only when the figures presented white side up did not allow for a sensory orientation towards color. Even in that case she could not account for the principle of form. When presented with three heaps of circles, triangles, and squares, white side up, she accepted these groupings by saying, "Yes, that would be all right, they all go together with the color."

The further protocol on patient R. shows in principle the same characteristics. Still more striking than the hitherto-given illustrations, this protocol exemplifies that patient's extreme dependence upon what is the most impressive sensory aspect under the given arrangement at the time. To make this point clear we include Weigl's experimental variations:

Experiment IV. In order to scrutinize the immediate way in which likeness of color or form suddenly thrusts itself phenomenally upon the apprehension of the subject, the experimenter arranged the following experiment: The patient was given all 12 figures with the white side up. He was asked to sort them. The patient observes first: "All white." Then fairly rapidly he puts together all those of like form in *three separate rows*. Now that a phenomenal organization on the basis of color is no longer possible, the element of form immediately obtrudes, i.e., with the element of color which, because of the color differences does not permit homogeneous organization, being not effective, the element of form can become the prevailing stimulus.

Experiment V. The patient is given 8 figures of different color and form: 3 triangles (one red acute angle, one yellow equilateral, one green obtuse angle), 3 quadrangles (one red oblique angle parallelogram, one yellow oblong, one green square), 2 circles (red and yellow). Although Experiment IV with the suggestive organization of form elements had preceded the present experiment, the patient immediately put the figure of *like color* together.

Experiment VI. The same figures were presented with the white side up and no specific directions given. The patient arranged them in the following line:

⁴⁷ And *vice versa* as shown by later protocols.

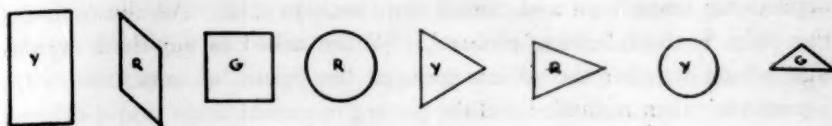


FIG. 23

When asked what this method of arrangement meant the patient made an angle with his hands, signifying that he had put the figures together according to decreasing size, in the form of a wedge.

Experiment VII. Since in Experiment V all the insistent urging to "sort differently" did not help the patient at all, the experimenter took these figures away and restored the original arrangement of figures with identical forms white side up as in Experiment III. Without hesitation the patient put the figures of like form together, then these figures were taken away and the patient was again given those of Experiment V—white side up. He was told to sort them "just as he did those of a moment ago." The patient hesitated a long time; he constantly tended to arrange them once more according to size (wedge), until he suddenly exclaimed: "Ah," and now he immediately put together the 3 triangles, 2 circles, square and oblong. He held the parallelogram in his hand for some time, then put it with the oblong with the explanation, "a little crooked" (*i.e.*, just like the oblong only crooked).

From the explanation with which he put the parallelogram with the two other quadrangles, we can conclude that here again he did not proceed with the help of a principle of classification, but that he put the figures together only according to their palpable congruency as to form. If we compare the results of Experiments V-VII with the preceding experiments we can establish the fact that the patient in both cases reacted identically. In these last experiments too he was determined first by the element of color in spite of the preceding experiments favoring a reaction to form. But a special coercive condition in Experiment VI was necessary to bring about a reaction to the formal element.

The difficulty of shifting can express itself in a rigidity of different kinds. In some cases the patient's inability to shift voluntarily can assume a rigidity which expresses itself in the carry-over of a passively-induced shift into the next task, so that the patient now reacts in the acquired way but cannot change that reaction any more. For example, by means of the experimental variations a patient may have been brought into the attitude to respond to form after he has been responding to color. He now persists in his acquired

dependence upon form and cannot shift back to color. An illustration of this point is the following protocol. "When asked to put those together that belong together the patient grouped the figures of same color. The figures were then reshuffled and the patient requested to do it in a different way. He repeated his earlier performance. The figures were then turned so that the white side was uppermost, and the only 'variable' present under these conditions was form. The examiner then turned the figures to the earlier position in which the colored side was now apparent. The patient still sorted on the basis of form. He was not able to sort according to colors when instructed to do it in a different way. The performance of this patient indicates that he was controlled by one set of stimulus impressions and could not free himself from these *voluntarily*. When the stimulus conditions were controlled, so that there was but one possibility present, the patient sorted on the basis of form. Having once been brought into this attitude by the experimenters changing the conditions, he continued to sort for form when both form and color were present. Thus, he could not shift voluntarily from color to form in the first part of the test, and after having been brought to attend to form, was then unable to shift from form to color. The rigidity of the patient can express itself also in the complete failure to arrange the figures according to form after they had been grouped according to color even in the presence of the figures white side up" (8, p. 25). The rigid continuance of a set once established is shown in the following instance: When the figures were turned to the white side, and the subject was again asked to sort them, he proceeded in a slow, laborious way as if the task were very difficult. He arranged them into four piles in which different forms were mixed up. When asked how he had done this, he said, "Done with the back up. For you to see if I had the same colors together." The subject behaved as though controlled by the earlier attitude. He seemed to regard the figures as colored figures "with the backs up" and so was not impressed by other similarities in the materials presented to him.

V. *The Patient Cannot Generalize; He Cannot Learn.* May we recapitulate the findings of our protocols, which are typical samples of many more cases investigated. The patients' responses are determined by the sensorially-obtruding aspects of the material, either as they are so experienced, or as they are made to prevail by the experimental set-up. He builds a pattern of colored figures, when the color element prevails phenomenally and in most instances he builds a pattern of shapes, when the shapes prevail phenomenally—as in the arrangement of figures white side up, etc. The

patient is unable to shift volitionally from the color impression to the form element as long as the color variety is sensorially dominant and *vice versa* (as in the groupings of colored figures according to shape by the experimenter). This defect does not pertain alone to the capacity of abstracting and understanding the equality of shape or color as a common denominator. This impairment of categorical attitude entails the incapacity to generalize in two directions. (1) The patient can neither reflect upon, nor conceptualize his "doing" and arrive at any category or principle. Factually, most of the patients form groups of *either kind*, shape or color according to the experimentally-produced shifts forced upon them. However, this in no way helps a patient to learn from his own doings what the task demands. He is unable to generalize, that is, to apply the meaning of a once-attained result to other situations. In most cases here cited the patients grouped like shapes at least once during the test. This did not result in a sorting according to form under the other presentations, and if it were attained, then it was a rigidity which could not be abandoned thereafter. Therefore the test result is not only an indicator of the patient's potentiality to form a concept, but also of his ability to learn. It should be noted that in investigations on dementes, aments, and normal children, the following findings point to the same conclusions.⁴⁸ All children (chronological 8-9, mental age 8-1 to 10-8) could sort according to both categories, and none produced arrangements of figures in form of patterns. All were able to verbalize the principle of their classification. In the group of aments and dementes there was an inability to shift in attitude voluntarily and a rigidity of a once-established set. The dementes showed a preference for form whereas the aments reacted more to color.

DIRECTIONS

The Ishihara color efficiency test is first administered to rule out defects in color vision.

The subject is presented with 12 unarranged cardboard figures of different color and form: four equilateral triangles (red, green, yellow, blue), four squares (red, green, yellow, blue), four circles (red, green, yellow, blue). A careful record is taken of all verbal exchange between the subject and the examiner. A protocol is made of each grouping the subject makes and his arrangement of figures is carefully copied; the sequence in which the subject arranges the figures is recorded by numbering the recorded placements in design fashion. Examiner instructs the subject: "Sort those figures which

⁴⁸ Bolles, M., *i.e.*, 9 dementes, 10 aments, 10 children.

you think belong together," or, "Put those together which you think can be grouped together." (Variations of *wording* are permissible if subject does not seem to understand.)

Experiment I. Sorting. If the subject asks any questions as to how he should group the figures, etc., examiner answers, "That is entirely up to you." Attention should be paid to whether or not the subject builds a pattern.

After the subject has completed his grouping, examiner asks: "Why have you grouped them that way?" or, "Why do they belong together?" or, "Why do they belong this way?"

Experiment II. Voluntary Shifting. After the answer has been recorded, examiner asks the subject: "Put the figures together in another way," or, "in a different way." After the subject has completed his grouping the examiner inquires as in Experiment I.

Experiment III. Induced Shifting. a. If the subject grouped first colors and was unable to shift to form in Experiment II, the examiner turns the figures with their white sides up and asks the subject to sort them as in Experiment I. After the subject has completed his grouping the examiner inquires as in Experiment I. b. If the subject has grouped according to shape, the examiner turns the figures again back to the colored sides and repeats the procedures of Experiments I and II.

In Experiment I and II the subject is scored successful if he can sort and *shift* without difficulty (time) and account verbally for the principle of his sorting. He is scored unsuccessful if Experiment III a is necessary and the patient thereafter had not learned to sort differently, so that he does not succeed in Experiment III b to sort according to color *as well as* according to form.

Control Experiments

Control experiments are indicated in any case of doubt regarding the subject's ability to conceptualize or to shift. Particular caution is indicated in three instances. (A) When the subject's verbalization is ambiguous. (B) When the subject persistently builds patterns, irrespective of his otherwise seemingly satisfactory verbalization. (C) When the subject's performance is not consistent on Experiments I through III. The term "inconsistent" is taken to mean that the subject may have responded satisfactorily on Experiment I but not on II, or *vice versa*, and may even have given seemingly logical accounts of the groupings he formed in the successful experiment. (In this connection we should reemphasize what

has been said about the misleading use of general words or names on the part of patients when these words bear no categorical meaning—page 10 f.) Such inconsistencies definitely occur and should not be brushed aside by the too hasty assumption that, due to a lapse of memory, the subject has simply forgotten the basis of pertinence in his immediately-preceding sorting. The following experiments are indicated in cases (A), (B), and (C).

1. Present the subject with groupings of like shape or color placed in heaps and ask subject whether this arrangement makes sense to him and, if so, why. Vary the *number* of groups presented of same pertinence as well as the basis of pertinence of the groups and ask the same question. If the patient does not evolve the principle or accept the groupings of, e.g., all circles, all triangles, all squares, substitute a triangle or square for one circle in the circle-group and ask: "Is this all right too?" Vary this procedure by substituting for one figure of one group a figure of another group and ask the same question. If the subject accepts the exchange and does not object from a definite conceptualized viewpoint, his response is scored definitely concrete. (Some subjects object on esthetic or similar grounds. This, of course, is not considered abstract.)

2. If the patient persists in patterning his groups, (a) exchange the figures or colors in the respective groupings of the subject and ask whether this makes any difference to him. For example, if the subject has formed a group of circles red, green, blue, yellow in a definite *pattern*, this is not convincing evidence that he really has sorted according to form. He may have just sorted the previously-grouped colors differently this time, understanding the instruction to sort differently in that way (see page 119). If the patient now accepts a yellow triangle instead of the yellow circle, he could not have sorted according to form. (b) Interfere with the subject's patterning by asking him to hand over the figures he selects and conceal them from his view. If the patient now gets lost or groups figures which do not belong together conceptually, it is obvious that he did not sort according to a principle. The examiner may also interfere with the subject's patterning by varying the position of figures as described under (a) or according to the special needs for clarification. (c) Use the 48-figure set instructing the subject to sort as fast as he can. If the subject does not give up his patterning to throw the figures in heaps, abnormal concreteness is indicated. (d) Ask the patient to put the figures he chooses in separate piles or heaps but not in any other arrangement.

3. The 48-figure set should also be used as additional control when the subject did not pattern his arrangement but gave equivocal verbal responses.

The experimenter should feel free to add any variations of the described experimental methods. For instance, it may be a valuable supplement of the test (which we so far have not tried out) to use the 48-figure set by introducing an immense disparity of size of the figures of like shape; it may be also advisable to vary the basic shape of the square, circle so that parallelograms, rectangles, trapezoid forms are included under the category of four-cornered. In the same sense the circular and equilateral triangular shapes may be varied to eliptoid and incongruent triangles of different kinds. The examiner should bear in mind that each of the suggested experimental variations is to serve the purpose of determining unequivocally the presence or absence of conceptual shifting ability in the subject.

THE GOLDSTEIN-SCHEERER STICK TEST

Description of Test. The purpose of this test is to determine whether the subject is able to copy figures, composed of sticks, and reproduce them from memory. The test is divided into two parts, the first—copying while the subject is looking at the sample figure; the second—reproducing after the figure has been exposed for 5-30 seconds and then removed. The sequence in which the stimulus figures are given represents a scale of increasingly intricate configurations in the geometrical and the numerical sense (pattern and number of sticks see Figure 24, No. 1-34).

S. is instructed to copy or reproduce the sample figure with the sticks given him. These are equated in number and length with the sample sticks. Two sets of sticks of slightly different length are used, so that certain figures contain sticks of both types (length a —3.5 inches; length b —5.5 inches). The subject is instructed and encouraged to say whatever idea the figures arouse in him, or of whatever they remind him. For further clarification experimental variations of this procedure may be added such as reproducing the stick model or a drawn model by a drawing.

BEHAVIORAL ANALYSIS⁴⁹

The Abstract Factor in the "Normal's" Response.⁵⁰ To reproduce the purely geometrical figures the normal subject has to combine *both* attitudes, the concrete and the abstract. In order to appreciate this interrelation, it has to be emphasized that the apparent simplicity of the task for the normal conceals the way in which the abstract attitude participates in the process of solution. In our cultural matrix we have become habituated to handling purely directional features in space, so that we hardly realize how much abstraction they involve. Yet the more or less meaningless figures are not concrete, palpable objects in a manipulative context. The spatial sphere to which they belong is not the dynamic "life space" of ego-related action.⁵¹ What the figures present as visual percepts is far from the realistic properties of a "living thing." They are mere configurations of spatial directions in a detached, purified sense. They imply both space and direction as entities in themselves. Therefore they are abstract features in an abstract geometrical space, bearing no direct reference to a tangible life situation.

⁴⁹ The following analysis is based on the investigation of Goldstein and Katz (25), and on case material studied by Goldstein, Scheerer and Nadel.

⁵⁰ In the following the term "normal" refers exclusively to adults.

⁵¹ See Lewin (49) and Koffka (45).

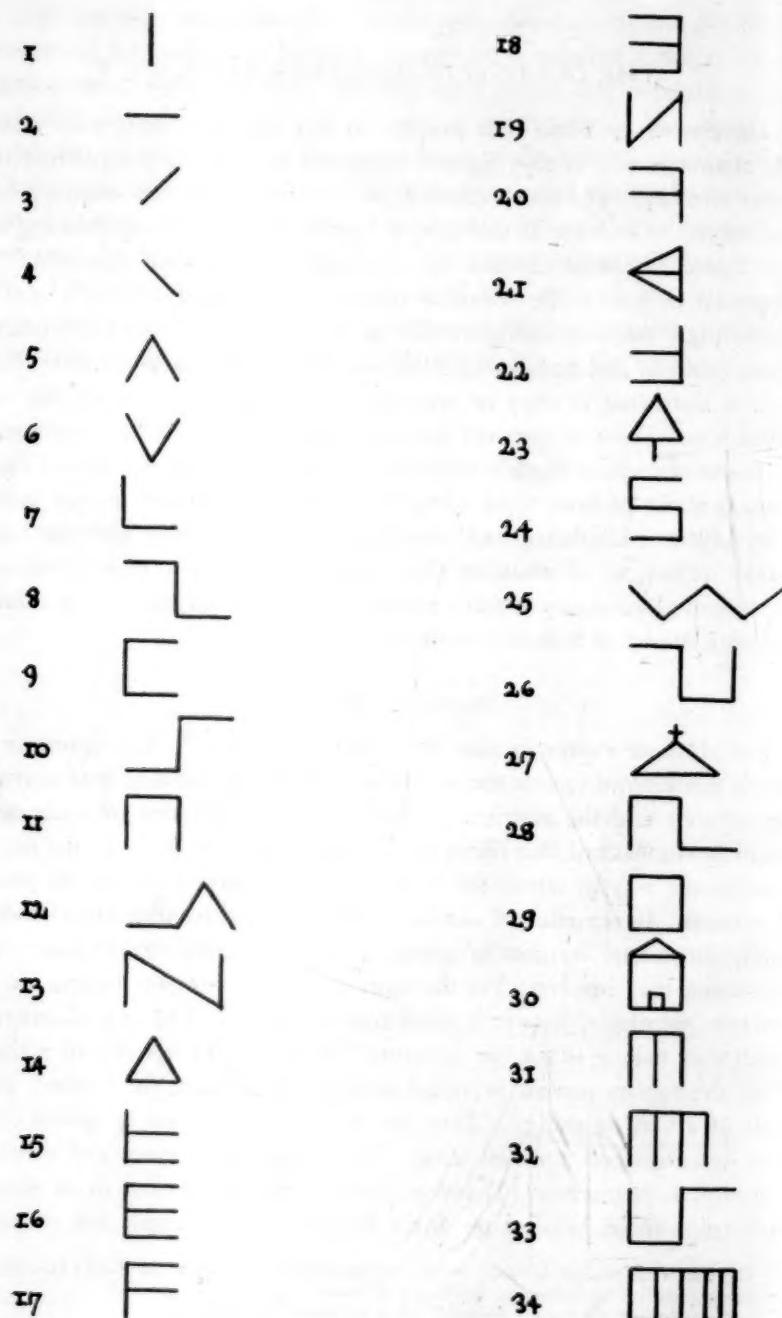


FIG. 24

The normal is not immediately aware of this fact when he reproduces these items volitionally from memory. The procedure takes place on a concrete plane. The subject unreflectively retains what he saw, but at the same time this process is embedded in and guided by an abstract attitude towards space. Without a generalized *idea* of space in the "abstract," he would be unable to conceive and hence evolve a purely geometrical scheme of direction. We could not retain such an unrealistic entity without having the capacity for mapping out "ideally" a spatial system with coordinates independent of our own bodily orientation.

We can become distinctly conscious of this conceptual frame of reference and of the fact that spatial direction, as such, is of highly abstract nature, when we have to bear in mind a complex geometrical pattern. The intricacy of different directions, number of lines and shapes is readily experienced as a challenge to our capacity. We have to retain an unrealistic spatial arrangement by one complex act of "ideation."

If this description corresponds to the facts, the following broader applications may be pertinent:

1. The copying or reproducing of senseless figures requires the abstract attitude.
2. The normal person in our milieu, though experiencing a conscious effort to hold in mind the pattern of geometrical directions, is not aware of this as an abstraction, because this act has become a more or less learned performance. Due to our training, the concrete retention of what we saw and the categorical orientation towards space, work hand in hand almost automatically. In the introduction we have already mentioned such phenomena either as a secondary result of past experience, or as primary, functional interrelation of both attitudes in many behavioral reactions of everyday life.⁵² We have pointed out that many a performance whose conditional background is the abstract attitude runs off in an automatic concrete fashion so long as no obstruction occurs to necessitate an activation of the abstract function in the sense of a shift. This is illustrated by the aforementioned example of a more intricate geometrical task, where such a shift and reactivation is demanded.

3. Those figures which appear geometrically simple to the normal may offer difficulties to an individual with impairment of abstract attitude—difficulties which are comparable in degree to those which the normal encounters in the above example of the complex geometrical pattern. However, this should be taken as an analogy which, like most analogies, furthers

⁵² Cf. page 8.

understanding only to a certain point. In order to appreciate the difficulties which the abnormal encounters, the concrete factor has to be considered.

The Concrete Factor in the "Normal's" Response. If the complex geometrical pattern of our example should happen to represent the design of a "familiar"⁵³ object, e.g., a house, we would cope with the problem without experiencing that kind of demand upon our "ideational" ability. The design of the house may even contain geometrically more lines, more directions, in short, many more "parts" than the senseless figure we failed—still we will solve the task.

Moreover, the "pure" geometrical figure, if presented to a mathematician, may appear to him as a "familiar" symbol which he grasps at once. "Primitives," who live in round huts, will have difficulty in grasping the design of our house. They may have the same experience of an intricate, unsurveyable pattern as we do when facing the complex geometrical figure. It may not be amiss to add another example: In certain tribes religious symbols bear colored designs made of dots. There, this familiar design is easily reproduced from memory without knowing the number of dots.⁵⁴ Whereas there the symbol is dealt with as a common object, to us such reproduction would involve a highly abstract task.

What do these facts signify? Reproducing is easier when one is confronted with a drawing which represents a concrete, tangible thing, than when one is faced with a configuration with which one cannot deal in a concrete way. What represents an object or object-like entity to one person need not bear this palpable character for another. The nature of the response depends to a far-reaching degree upon the background of an individual. In the same sense it depends upon the entire cultural setting, whether a design-pattern belongs to a realistic life context, or appears as a senseless abstraction.

We are now prepared to supplement our first statement regarding the approach of the normal in this test. As we have explained, he needs the abstract attitude to succeed on geometrical figures which appear senseless to him. Yet, he may proceed concretely when the pattern consists, to him, of a familiar object-like presentation. He may recognize an angle pointing downward as a V, or the design E as an E, thereby responding in a concrete fashion. However, he is not at all forced to do so. Neither does he depend upon such reification for solving the task, nor does he encounter any difficulty in shifting from a concrete apprehension to one which involves the abstract co-determination of his response. In addition, when asked, he

⁵³ See discussion of this term, page 137, anon.

⁵⁴ Cf. Wertheimer (77), p. 109.

will be able to account for the purely geometrical aspect of different spatial directions in a design, even in case he first absorbed the presented pattern concretely as a familiar thing. Finally, he will perform adequately on those figures which he experiences as meaningless.

THE CONCRETE FACTOR IN THE ABNORMAL'S RESPONSE

Success and Failure Due to Concreteness. From this analysis and from numerous investigations on patients we can derive the following rules for the reactions of an individual with impairment of abstract attitude.

1. The patient will encounter difficulties on this test whenever he is unable to deal with the presentation on the concrete level. Yet, whether or not he will respond to the particular task in a concrete fashion cannot be predicted from the configuration proper. He may at one time respond in this fashion, another time he may be unable to give any performance at all; still another time he will reproduce figures which he failed to grasp ideationally by following his visual or motor image.⁵⁵ The patient's concreteness in each instance depends upon what, under the present circumstances—due to his background—appears to him as a "thing." In brief, the patient can come to terms with the stimulus only when the total situation permits him to draw upon his concrete ways of responding—including visual or motor aids.

2. This need not imply that the performance of the patient on this concrete basis must be correct in every task. It is the characteristic of an individual with a default of abstraction that he seeks to cope with the task in *any* practicable way. This practicable way is dealing with the stimulus by the concrete means available to the patient and may lead to a correct response and may not. The product may be a correct duplicate or a distortion.

3. Therefore it is not sufficient to score the patient's performance correct or incorrect. It is insufficient to base the verdict, regarding lack of abstraction, upon incorrect responses alone. Even the correct responses signify a defect of that attitude, if they have been attained by the patient solely in a concrete fashion; *i.e.*, if he could not master the stimulus figure without "unduly" resorting to these means. It is not what the patient accomplishes that counts, but what underlies the way by which he achieves it. Of course, it is not easy to check the patient's procedure in each instance, *e.g.*, to find out whether he could reproduce an angle pointing downward without also apprehending it as a V. Therefore the patient's responses on the *entire* test have to be compared with respect to this question:

⁵⁵ How this can be proven and controlled, see page 148 f.

Can the subject proceed without resorting to concrete means? Can he solve "abstract" figures, or not? For example, if the subject cannot reproduce one figure which is senseless to him, but another, for instance a square, because "it is a mirror," then this difference and inconsistency is the crucial symptom of telling diagnostic value; it indicates that the subject could accomplish a result only on a concrete basis.

4. The following measures of the degree of the defect are indicated:

a. A subject who fails in the phase of copying is more deteriorated than one who fails in the phase of reproducing.

b. An individual who cannot perform without resorting to concrete apperception and produces a "distorted" feature is more disturbed than one who under the same conditions achieves a correct reproduction.

c. A subject who cannot come to terms with the stimulus figure in a concrete manner will either not respond at all, or form a composition, which, due to lack of ideational planning, is determined by mere sensory impressions. This reaction to the sensory element will manifest certain trends towards a more primitive organization of perception. The term primitive is to be understood as a simpler level of figure-ground articulation and spatial structuralization.

In the following we present some data derived from our case material in order to substantiate the analysis here advanced. We will focus also on typical "errors," *i.e.*, distortion of the original figure.

SYMPTOMS OF ABNORMALLY CONCRETE PROCEDURE

a. *Concrete realism ("familiarity") versus geometrical simplicity and complexity.* One of the telling signs of abnormal concreteness on this test is the aforementioned "difference and inconsistency." A patient such as Rat. (63 and 22, *p. 27*) might be entirely unable to reproduce correctly the simple position of one stick, *e.g.*, pointing from lower left to upper right, because the direction makes no sense to him. The patient could also not reproduce an angle pointing downward. He said: "That's nothing." Yet he presents a striking illustration of "inconsistency," as he easily reproduces an angle pointing upward. Asked what it was, he said: "That's a roof." Whereas he was unable to reproduce such simple presentations as designs

7  and 10  (Fig. 24) after removal, he could, without hesitation, reproduce design 30, the house, which contains 9 lines, different in length. Pt. O.⁵⁶ usually reproduced the one-stick-position wrongly, though she had

⁵⁶ Cf. Goldstein and Katz (25). The case stands for many others with cerebral lesions.

copied it well in the preceding task and again had looked at it for 30 seconds before removal. She copied and reproduced both angles $\wedge \vee$

correctly by drawings. Interrogated, she called one a roof, the other a V; but when faced with a square, she inserted a cross into the square which she drew and called the sample figure a "window." That she was unable to draw a square form alone is evidenced in her incorrect reproduction of designs 26 and 28 as squares (reasons for this form will be discussed later). She failed on designs \wedge (12) and \square (21) ("Do

not know what this is"), but succeeded on the house design without difficulty. Another patient, Riv., was unable to copy the "simpler" stimulus figures, but when presented with the house he succeeded immediately and said: "That looks like something."

From Figure 25 one can easily see how correct results on complex designs are attained by assimilating them into "familiar" things. The instances of success with complex figures, attained by *concrete realism*, outnumber the results on geometrically simple figures where that expedient factor is absent. Obviously the geometrical simplicity in terms of pattern and number of elements does not foster success. In the same sense geometrical complexity is not the factor responsible for failures or errors.⁵⁷

The cases 11 and 13 on Figure 26 offer a clear-cut confirmation of the fact that concrete realism qua familiarity operates more effectively towards obtaining results than geometrical simplicity. In general, Table II contains illustrations of the factor of familiarity. It has been found that normal subjects do not show this trend towards assimilation of the stimulus figure into "familiar" experience because the figure is so simple. Recent experiments (37) with normals who are free to change given designs according to their taste of what is a "good Gestalt," show no stronger influence of a tendency towards more familiar designs than of a tendency towards symmetry; in fact, the latter operates almost more effectively.

b. *Concrete realism versus frequency and recency.* In the preceding paragraph we have elaborated on the factor of "familiarity" as instrumental in dealing successfully with the sample figure. It remains for us to make it clear that familiarity, or past experience in the sense of frequency, recency, etc., is not the cause of concrete responses. It is rather only one of the possible avenues through which concreteness finds its expression. The palpable, thing-like character which many subjects attach to the stimulus

⁵⁷ Carmichael and associates (13) study on reproduction of named ambiguous drawings may be a case in point.

Stimulus Figure	Copy	Reproduction after removal	Comments
△			"A roof."
▽			"A V."
L		L	She spontaneously says, "That is a Z."
□	□		
L	L		"A Z."
△ □ L	△ ↗		"Do not know what this is."
E	E		"An F."
E	E		"An F."
E	E		"An E."
△			"A flag."
△			"Do not know what this is."
△			"A tower."
△			"A tower."
L			
□	□		
△			"A steeple."
□	□		"A window."
⌂	⌂		"A little house."

FIG. 25

Stimulus figure	Reproduction after removal	Comments
		"Yes, I don't know the name, farmers use it to cut wheat." "(Scythe?)" "Yes."
		"A spade."
		"A ladder."
		"One quarter of a circle."
		"A circle with the side missing."
		"A circle with the bottom missing."
		"An F."
		"F."
		"F."
		"Mirror."
		"I forgot it, do it again."
		"Two triangles pointing up."
		"A mirror, a triangle here, and two sticks . . . a mirror and a little house."

FIG. 26

figure is not the fixed product of past associations. It is also not simply read off from the stimulus, or inherent in the latter. The impression of familiarity is not forcibly occasioned by the configuration itself, not a mere function of the figural properties in an objective sense; if it were so, then all patients would react alike to the same stimulus figure. But that is not the case.

Gaillat.

The abnormal subject, in contrast to the normal, is much more strongly driven to come to terms with a task which overtaxes his capacity. He therefore sticks to any one aspect of the stimulus constellation which facilitates a result. This tendency leads to a "selective" reaction, different in each individual and without having the "ever same" associative bond between bits of past experience. It is for this reason that the aspects of familiarity which come into relief differ so widely among different patients. Moreover, these individual differences express themselves in one case in a correct reproduction, in another in a discrepancy between the objective presentation and the subjective process of assimilating the stimulus figure. The patient may thereby produce a complete distortion; he distorts that figure into a "thing" which has only a faint resemblance to the original stimulus. The result runs counter to any effect of past experience with the sample as a whole or with its component parts.

This explanation is substantiated and supported by recent experimental findings of M. R. Harrower⁵⁸ in the field of perception.

note

She used Rubin's ambiguous profile-vase drawing and introduced subsequent modifications which enhance either the realness of the vase or that of the profile (3 of each sort); there was a marked difference between the performances of thirty normal subjects and of thirty patients with cerebral lesions. Both groups were first shown the ambiguous figure. When this was taken for a vase, the subject was then presented consecutively with the three *profile* modifications each figure enhancing the profile character over the preceding. If the subject "saw" a profile in the ambiguous figure, the same procedure was observed with the three *vase* modifications. The following results all represent deviations from the normal control group.⁵⁹

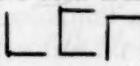
Of the experimental group, the 33 per cent who recognized the ambiguous figures either as vase or profile, persisted in this first perception on the subsequent modifications, despite the counterinfluence of their figural properties toward the opposite aspect. For instance, if the patient saw first a

⁵⁸ This work was carried out in the laboratories of K. Goldstein at Montefiore Hospital, New York, and of W. Penfield Neurological Institute, Montreal.

⁵⁹ Only two of the normals showed perseveration in the first modification and two failed to recognize the ambiguous figure. All others responded as expected.

profile, no vase was seen in the subsequent drawings, despite their "vase enhancement" and *vice versa*. The same percentage of patients could not apperceive the two aspects of the ambiguous figure simultaneously. Forty-three per cent of the patients were unable to make anything out of the ambiguous figure. There were 6 cases in which other objects in place of the profile or the vase were introduced by the patients either throughout the series or in parts of it: *e.g.*, "a priest," "a cardinal's hat," "mound of hay," "a fly," etc. In some instances the ambiguous figure could not be recognized as any meaningful object, even after the patient had correctly perceived all the mentioned modifications. Moreover, in cases where, due to enhancement, the dominant figure (profile or vase) was seen, this figure could not be recognized in the ambiguous drawing thereafter.

From these findings we can conclude that they confirm our statements concerning familiarity. In these patients there was rigidity of a once-established perceptual set on the one hand, and a general lack in the ability to shift, on the other hand. The latter deficiency manifested itself also in responses in which one figure being dominant had been apprehended in a drawing and thereafter could not be recognized at will in a drawing in which it was less dominant, and the other figure was dominant. These results indicate that the recognition of less or more meaningful drawings by patients is not simply the product of familiarity. The factor of familiarity is, rather, a variable, depending upon whether the patient can come to terms with the stimulus figure in any realistic way or not. For, if thereby he succeeds once, he may later stick to the attained result, notwithstanding the objectively stronger influences of the new configuration towards the apperception of *other familiar* characters. To say that the patient holds on to the once-established *familiarity*, does not answer the question, why he holds on at all. Familiarity as the answer would be begging the question, because it does not account for the failure to recognize the other familiarities, even when they were *enhanced* in the experimental arrangement. Therefore, the explanation must include the factor of rigidity, which is a symptom of concreteness, *i.e.*, abnormally exaggerated realism, but not simply dependence upon familiarity.

Similar responses have been found in our stick test. The consecutively presented stick figures   were not seen as an L and an open square, but as "one quarter of a circle," "a circle with the side missing," "a circle with the bottom missing." Figure  was not seen as the familiar W but as "two triangles pointing down," figure  not as the

familiar letter N, but as "a ladder" and reproduced thus / \|. N obviously was too abstract for him and he sought something more concrete and realistic. Another patient copies the sample Figure 2 correctly saying "it is a ladder." The consecutive presentation of ^\^ the patient reproduces as ^ calling both a "tower," and the two following 7 7 both as □. Patient Riv. copies △ correctly, calling it "a pineapple," "a tree." Evidently it was this that was suggested to him by the shape and not the "more familiar" triangle.

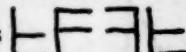
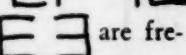
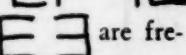
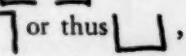
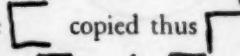
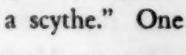
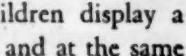
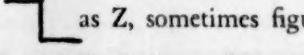
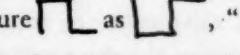
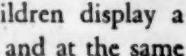
A further case in point are the instances in Harrower's experiment, in which a previously apperceived figure could not be re-identified in a new setting (first dominant, then less dominant, or contained in the ambiguous drawing). Here familiarity could not become the vehicle for recognition. Evidently the familiar aspect was outweighed by the new figural properties which either worked in the direction of another reality content (new dominant figure), or abolished the former reality content of the known figure (hidden in the ambiguous figure).

To summarize: past experience does not participate in the assimilation of the stimulus-figure in the sense of an associative linkage, independent of the concreteness peculiar to the patient; let alone does it constitute his concreteness. Past experience and familiarity are rather subservient to the superordinated rule that the patient tends to master the stimulus by any means available in the *present* total situation: That is, he must incorporate the stimulus in a framework of a tangible concrete realness; otherwise he cannot succeed in reproducing at all. This realness under one set of conditions may be of a familiar nature, according to frequency or recency; under another set of conditions frequency and recency have no effect at all. Therefore, reality for the patient can only be defined in the terms of his being able to deal with the stimulus figure as a *thing*, irrespective of its familiarity in terms of recency and frequency. For these reasons we prefer to speak of concrete realism rather than of familiarity as a factor operative in the figure-reproducing of patients.

It seems advisable to labor and to stress this point since in Nadel's work also the use of the term "familiarity" could lead to a one-sided evaluation of the results, emphasizing a mere associative aspect.

c. *Concrete realism versus objective Stimulus Constellation.* 1. *Changed Position.* One type of failure in the reproductions in this and other tests is often described under the caption of "Spatial Displacement," "Positional

Distortion," "Spatial Disorientation," etc. Yet closer analysis suggests that the patient did not mean to alter the position of a perceived figure. Nor did he apperceive the figure in a wrong position. In order to do that, the patient should first have been able to appreciate the meaning of positional relationship in some way. But this meaning is exactly what he cannot actualize. Furthermore, the character of the distortion shows usually a very definite trend, and is not at all of an arbitrary nature, so that one cannot speak simply of positional distortion without qualification.

Among others, we mention the case where the samples   were all copied as an F. Similarly the presentations of   are frequently copied as E, the open square  copied thus  or thus , the figure  as Z, sometimes figure  as , "a scythe." One may be reminded of the well-known fact that some children display a striking ability to recognize letters standing on their heads and at the same time evince little concern about the position of objects they draw (65).

Of course, there is a difference between the children and our patients. The child "knows" the object with which he is dealing, and spatial position does not mean much to him for the purpose of apperceiving. The child has not yet reached the stage where objects *have* to be in a definitely constant and fixed position in order to bear the character of objects in the outer world. The patient does not "know" the stimulus in that sense. He must first come to terms with it. Because he cannot master it otherwise, the patient responds forcibly on a level of handling the figure as a *thing*; hence, though both the child and the patient handle the stimulus as an *object*, they "ignore" the spatial position for different causes. The child really 'ignores,' because this factor is not yet relevant to him for recognition, the patient does not conceive of positional relationship because that meaning is no longer within his grasp.⁶⁰ And since he cannot absorb ideationally spatial relation as such, he has to "reify" the stimulus in some way and is bound to the thing-aspect with which he has identified it ( copied as ). Otherwise he could not come to terms with the "meaningless" figure at all.

2. Distortion.

We have mentioned the fact that the concrete means of

⁶⁰ Typical are the comments of two patients, Ren. and Rub., who copied the figure  in the position  saying, "I know it was a triangle, but which way I don't know."

responding do not warrant a correct copy or reproduction of the sample. Striking illustrations to this effect are the following: The patient has to copy the figure ∇ and reproduces it as E , saying "a flag." The same patient was presented simultaneously with the three patterns:

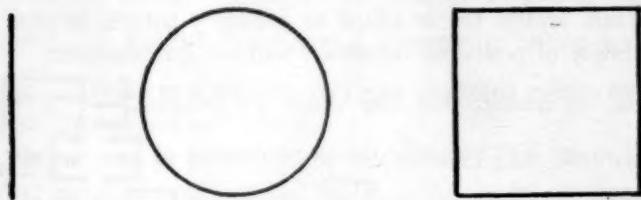
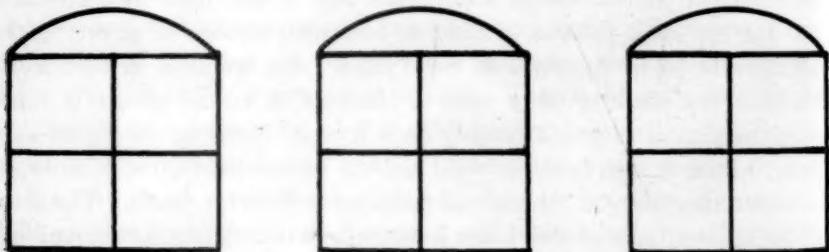


FIG. 27

She was able to *copy* the three patterns very well. However, when asked to remember the patterns, and after removal to draw them half a minute later, she first drew the figure \square and a short while later quickly made the following three drawings:



When asked what these meant, she answered: "Windows of a church." It is noteworthy that she drew the squares always with the lines inside and after she had finished one square, she repeated the same square each time with equal spaces between the next, the distance well proportioned to the size and distribution of the windows in a church. She was entirely unable to reproduce from memory the line, the circle, and the square alone as such.

Another patient, F., was faced with the same task but not to reproduce the patterns from memory; she had only to copy them. She began to demur and complained that it was impossible. Finally she attempted: \square

drawn very close to the model and then made a dot, surrounded by a square . Asked what she had done she said that  was a ten. The square was a "stamp." She succeeded once or twice in copying the figures  but never could make an independent square. In the latter case the utmost she could do was to trace along some of the lines of the original square.

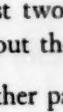
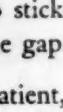
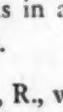
The same kind of failure and "distortion," due to a specifically-personalized realism is shown in the reproduction of  as  ("ladder") instead of the expected N, and in another case of  as  ("a Z").⁶¹

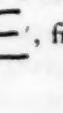
d. *Failure responses on the sensory level.* We have mentioned the fact that certain patients, who cannot come to terms with the sample figures in any of the mentioned ways, will in copying or reproducing depend on their sensory impressions. Since the latter are not under the guidance and control of structuralization in the abstract, the patient's composition will be deficient in figure-ground articulateness and correct positional relationship. For example, patient O. could not cope with the figure . She said, "Do not know what this is," and after several attempts copied it thus . Apparently she had the impression that the sticks lie at angles to one another but could not grasp articulately the relationship between the positions of the individual sticks. The reproduction on the basis of a less differentiated total impression frequently shows quite definite trends toward "preferred" perceptual configurations. The term "preferred" is here to be understood in the sense of what is more simple, convenient, and less difficult for the patient. In this sense the Gestalt rules of "*pregnance*," the tendency toward a well-balanced configuration, towards closure, etc., as elaborated by Wertheimer, here come into relief and lead to characteristic modifications of the stimulus figure.

The following illustrations taken from our records are samples of such typical modifications.

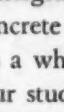
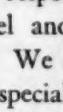
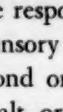
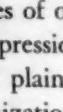
A patient was confronted with  which he copies in the following steps:

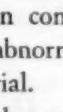
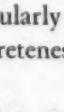
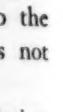
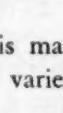
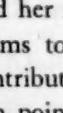
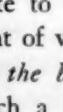
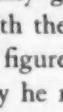
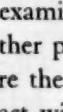
⁶¹ The following case of a German patient may be worth mentioning here. Confronted with the design of a circle, which the examiner had not closed correctly:  by oversight and asked what it may be, he answered: "A chimney brush." The German chimney sweeps carry with them a rope terminating into a brush and wound up in a circle.

I  II  III  Obviously the dominant impression was: Three sticks in contact with each other. In trying to reproduce this impression he took two sticks and placed them together in a right angle because this was for him the most simple, the most preferred configuration. Therefore, he formed the right angle and then wanted to place the third stick in contact with the two others already placed. The spatial arrangement of the first two sticks in a right angle was too far apart for the third stick to fill out the gap.

Another patient, R., was confronted with  and asked to copy it. He took one of his 3 sticks and placed it in the open gap of the sample figure. Apparently he experienced the figure as an unfinished square and followed his tendency to closure. This tendency was stronger than the effect of the instruction to copy what he saw. More accurately speaking, this instruction to copy could be absorbed only in the sense of doing something with the material, which leads to a tangible result.

The tendency towards *pregnance* as a symmetrical balance is especially effective when the patient does not know what to make of the sample,

e.g., figure  is reproduced as . Evidently the latter figure is better balanced than the stimulus figure. In the presentation of figures like these (a)  (b) , (c) , the reproduction often shows typical changes in the direction of simplicity and a more balanced organization. Figure (a) is reproduced thus , figure (b) thus , figure (c) thus  or .

Patient M. reproduces  as . Patient R. copies figure  thus . Figure  instead of being copied according to instruction is first solved by bringing two sticks to the sample figure (see broken lines) . In copying patients may show a tendency to build their stick pattern as close as possible to the sample figure. The above figure was first copied thus . On prompting, the patient built her pattern directly beneath the sample figure and thereby succeeded. Patient R. copies  by first placing the two sticks in this manner to the sample 

and the "return to the higher integrative responses" are comparable to the disintegration towards a concrete level and the restoration of the abstract level of the personality as a whole. We are mentioning this comparative aspect of Bender's and our study, especially for practical methodological reasons. The closest parallels to Bender's findings are obvious in those responses of our patients where the performance is specifically rooted in sensory impressions and where the individual has no other hold than to respond on a plain sensory level. In these instances the rules of simpler Gestalt organization come particularly to the fore. With regard to the other features of abnormal concreteness, here discussed, Bender has not analyzed her material.

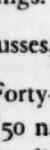
It seems to us that such further analysis may prove very elucidating and contribute to the understanding of a variety of syndromes from a common point of view.

Success on the basis of concrete sensory or motor images. There are cases in which a patient with impairment of abstract attitude succeeds without having really grasped the stimulus pattern. One patient, while being presented with the sample figure moved his hand rapidly, outlining the contour of the figure, and then was able to reproduce the figure after removal. Evidently he retained a motor image of his own movement, on the basis of which he could reproduce the sample figure correctly. For, if the examiner prevented these movements, the patient could not succeed. Another patient, in the task of reproducing, kept his gaze fixed to the spot where the figure had been presented on the table. As long as this visual contact with the fixated visual image on the table was not interfered with, he succeeded in his reproduction. If, however, the examiner forced the patient to change the position of his eyes, he was lost. Those two kinds of behavior, though they are not customary, may easily deceive the examiner by covering up the defect.

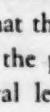
DIRECTIONS

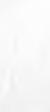
Examiner follows procedure as indicated on page 131 (description of the test) and presents figures 1-30 in consecutive order, first for copying, thereafter for reproduction. In the latter case figures 31-34 are included. The presentation of each figure may vary from 5 seconds to 30 seconds before removal, according to the condition of the patient. The patient is encouraged to say whatever idea the sample figures arouse in him, whatever they suggest. A record is kept of the patient's spontaneous comments, questions, and verbal responses and of the examiner's remarks. Each of the

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(see broken lines) and after prompting places his two sticks correctly but close to the sample  (see broken lines). We have encountered this tendency in our cube test. All these failure performances may be appreciated from the point of view that they are preferred sensory Gestalt organizations for the patients in their striving to master the material.⁶²

The reader, who is interested in studying in more detail how in pathological cases the Gestalt laws operate on the sensory level and in which direction visually presented patterns are modified, can find illustrations in L. Bender's recent work (6). Of the many instructive results we mention two interesting findings. In the work of Nissen, Machover, and Kinder (59)

which Bender discusses, the design  has to be copied (Army Performance Test).

Forty-six per cent of the younger and fifty per cent of the older children (50 native Negro children 5-13 years of age) copied that figure by rotating the diagonal crossing 45° so that the copied form showed the crossing of a vertical by a horizontal line .

With regard to the Gestalt law of pregnance this performance needs no further comment.

The other finding concerns the copying of certain of the well-known Wertheimer patterns by different types of mental defectives and the typical distortions which therein occur. Bender concludes: "It would appear, therefore, that in the lower grade defectives a considerable number of the individuals show the same specific type of disturbance which might be comparable to the specific disorders in the speech centers of the brain; or to dissociative phenomena which are associated with schizophrenia; or to specific impulse or perceptive disorders; or to confusional features which may accompany a number of different organic conditions" (p. 145).

Hence Bender's own findings seem to point to some common factor or personality change which Goldstein and his collaborators have stressed for many years.

Bender states: "These studies of disturbances in perceptual motor Gestalten in organic brain diseases indicate that the Gestalt principles are never fixed, but are the integrated response of the personality as-a-whole in any given situation.

In disintegrating cerebral lesions they tend to revert to more primitive levels, and, as the brain recovers from its insult, they tend to follow the laws of developmental maturation in returning to the higher integrative responses" (p. 76).

In the light of our findings the "reverting to a more primitive level"

⁶² Cf. page 41 of this publication and 24, pp. 148, 169, 171.

patient's compositions is recorded by the examiner in drawing it on a record sheet. Particular attention is to be paid to the possible round-about methods of the patient as described above. In case there is doubt as to whether the patient responded concretely or by abstract means, experimental variations such as introduction of other meaningless figures or drawings can be applied.

The test is particularly suited for cases with greater mental defectiveness or deterioration; e.g., Pick's disease (7, 50).

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